

So Ken, how's the water?



May 11, 2016

Ken Edwardson

NH Department of Environmental Services



So Ken, how's the water?



- TRENDS & WATER QUALITY DATA
- ISSUES
- OPPORTUNITIES

TRENDS & WATER QUALITY DATA

- 
- DATA
 - TRENDS
 - ASSESSMENTS
 - ACCESSED DATA
 - ACCESSING ASSESSMENTS
 - ACTION

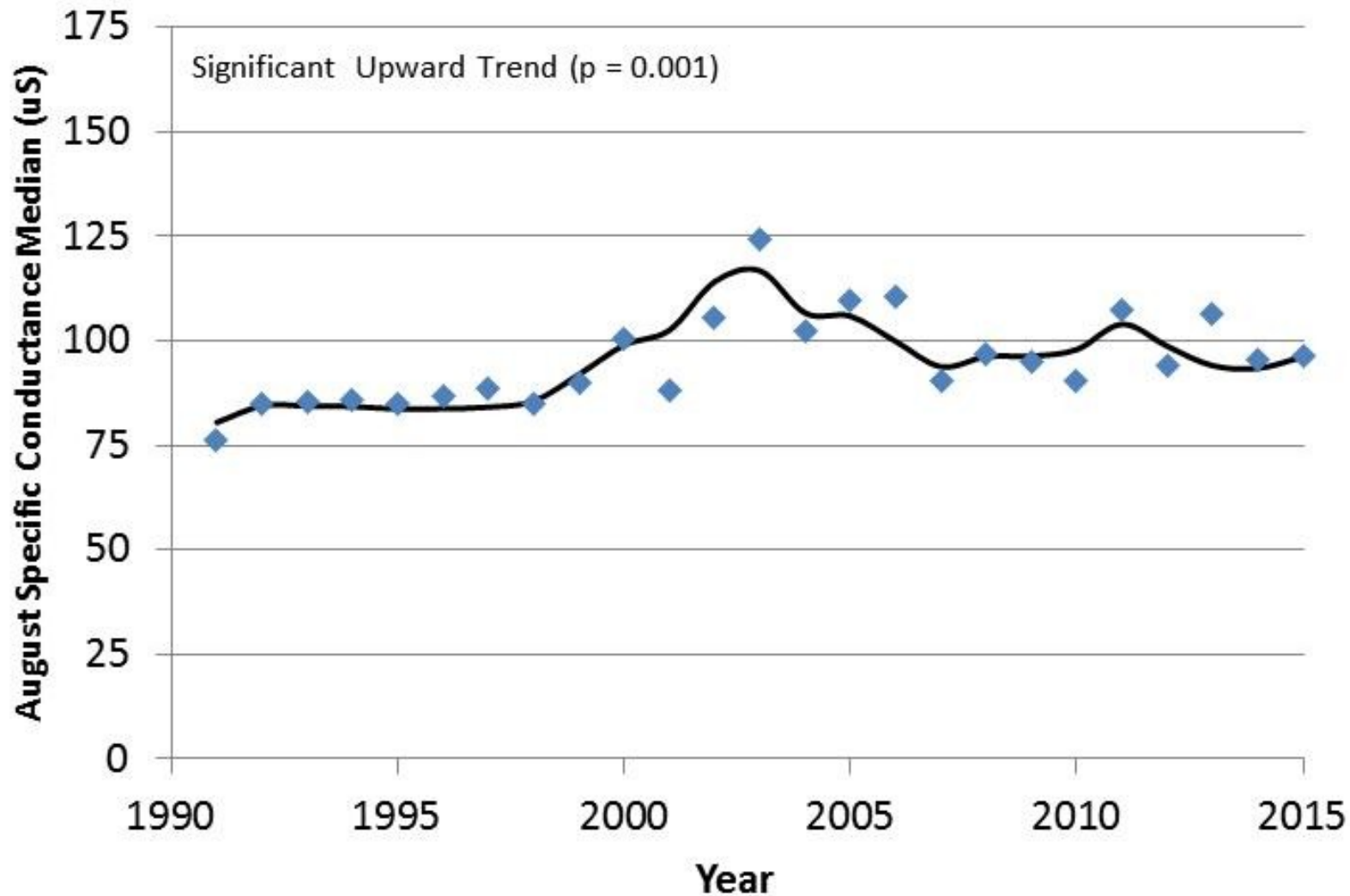
Water Quality Data

Environmental Monitoring Database (EMD)

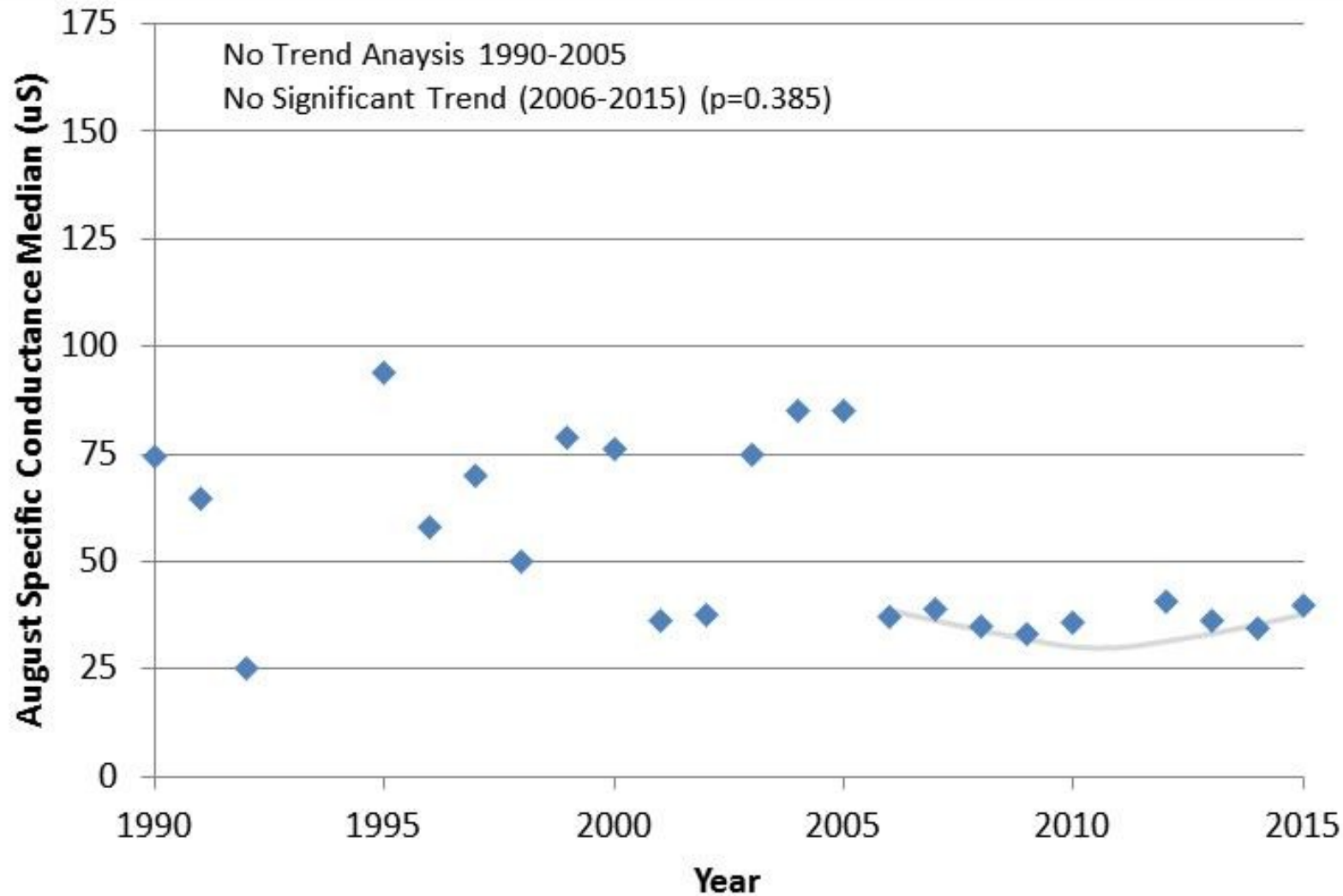
2.5 million surface water grab samples

Data is available on the web

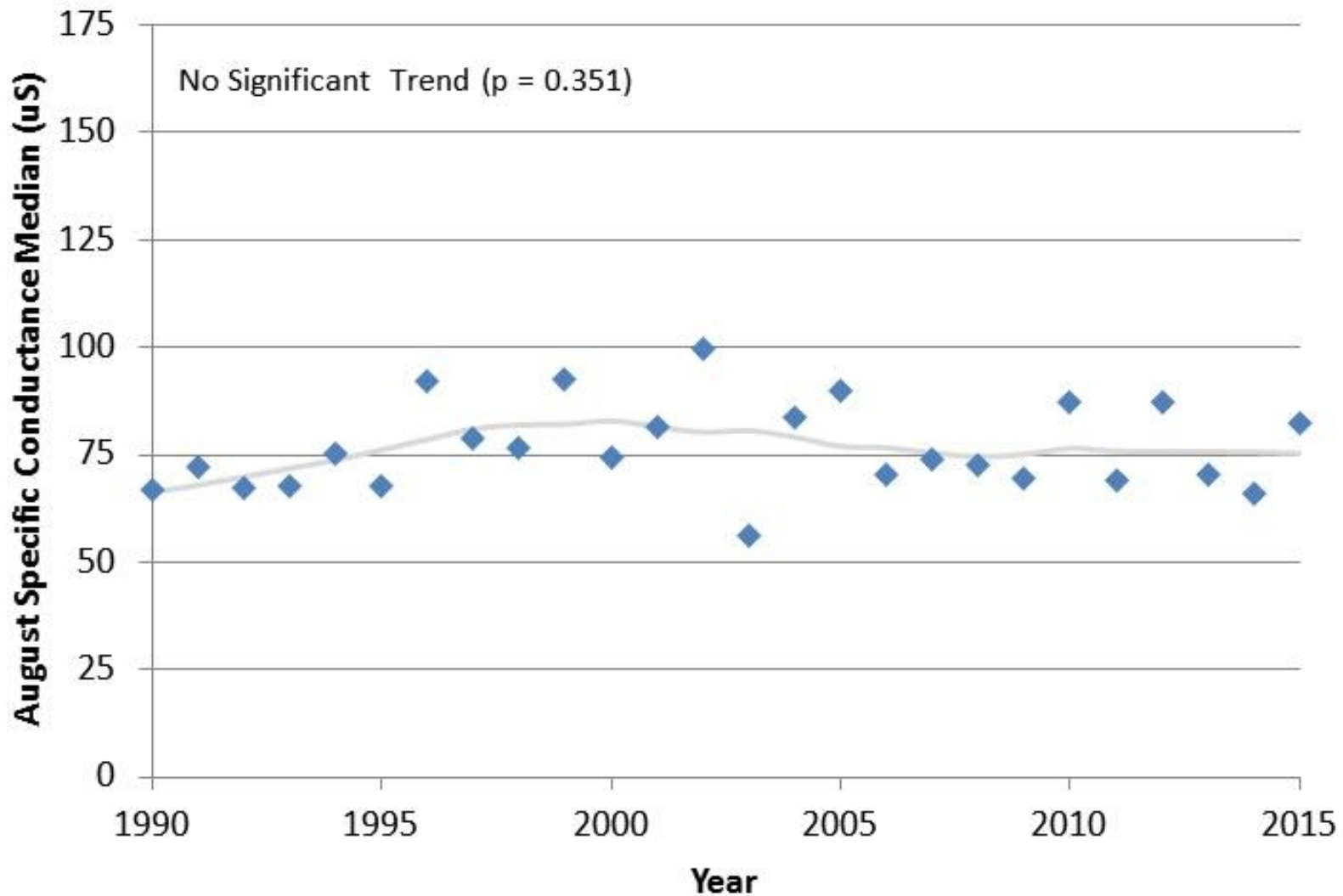
Rivers - Statewide Trend



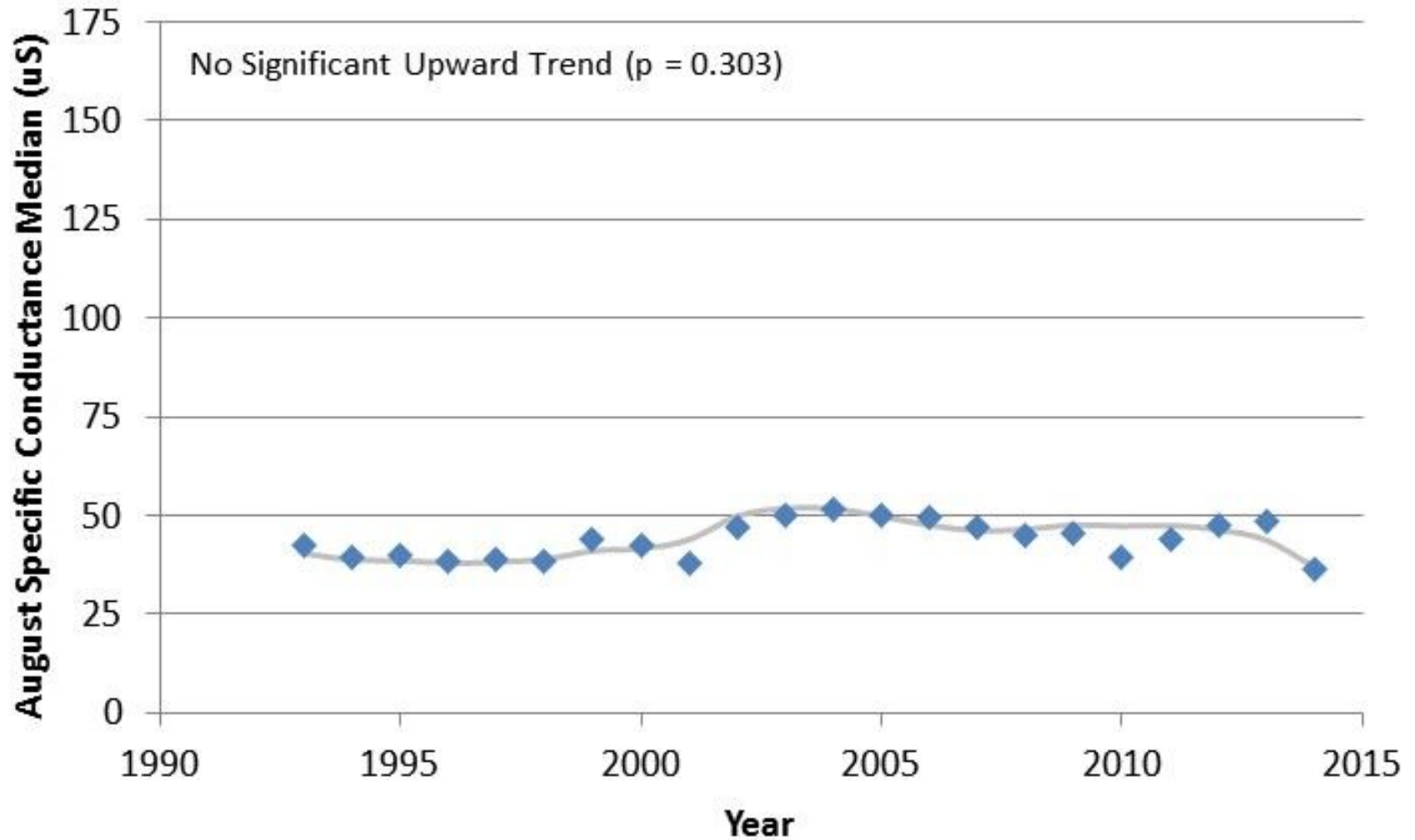
Rivers – Androscoggin WS



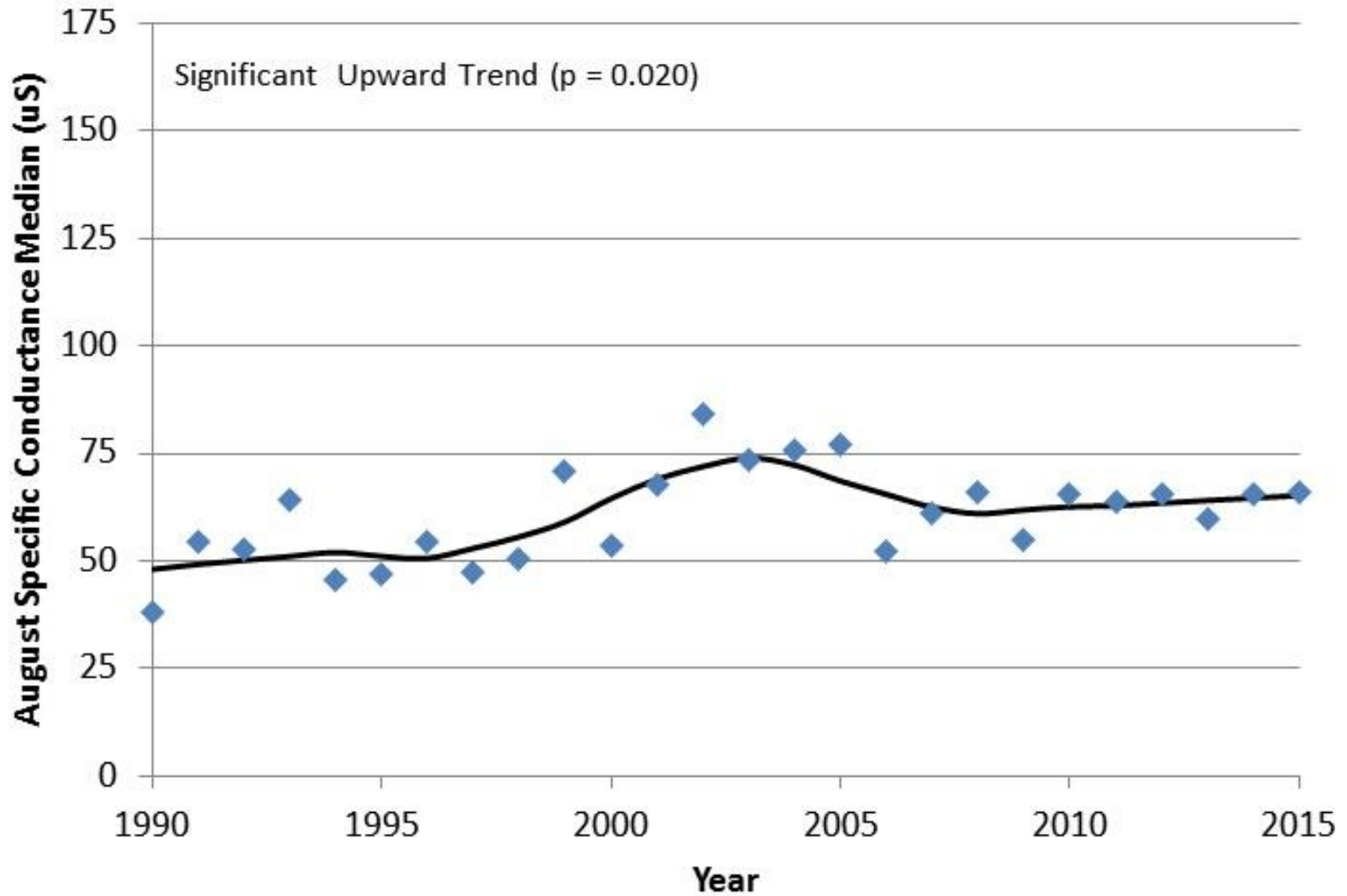
Rivers - Connecticut WS



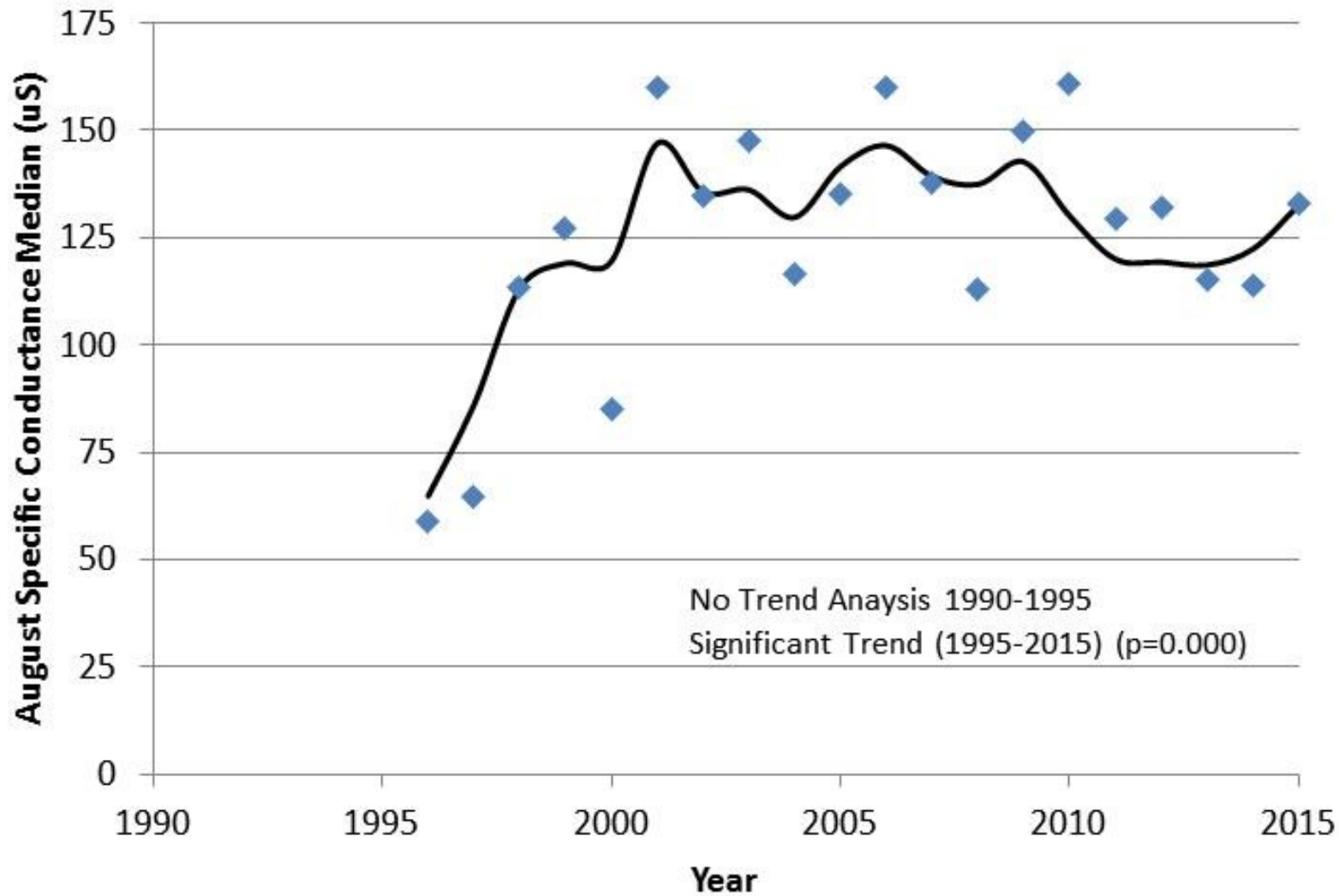
Rivers - Saco WS



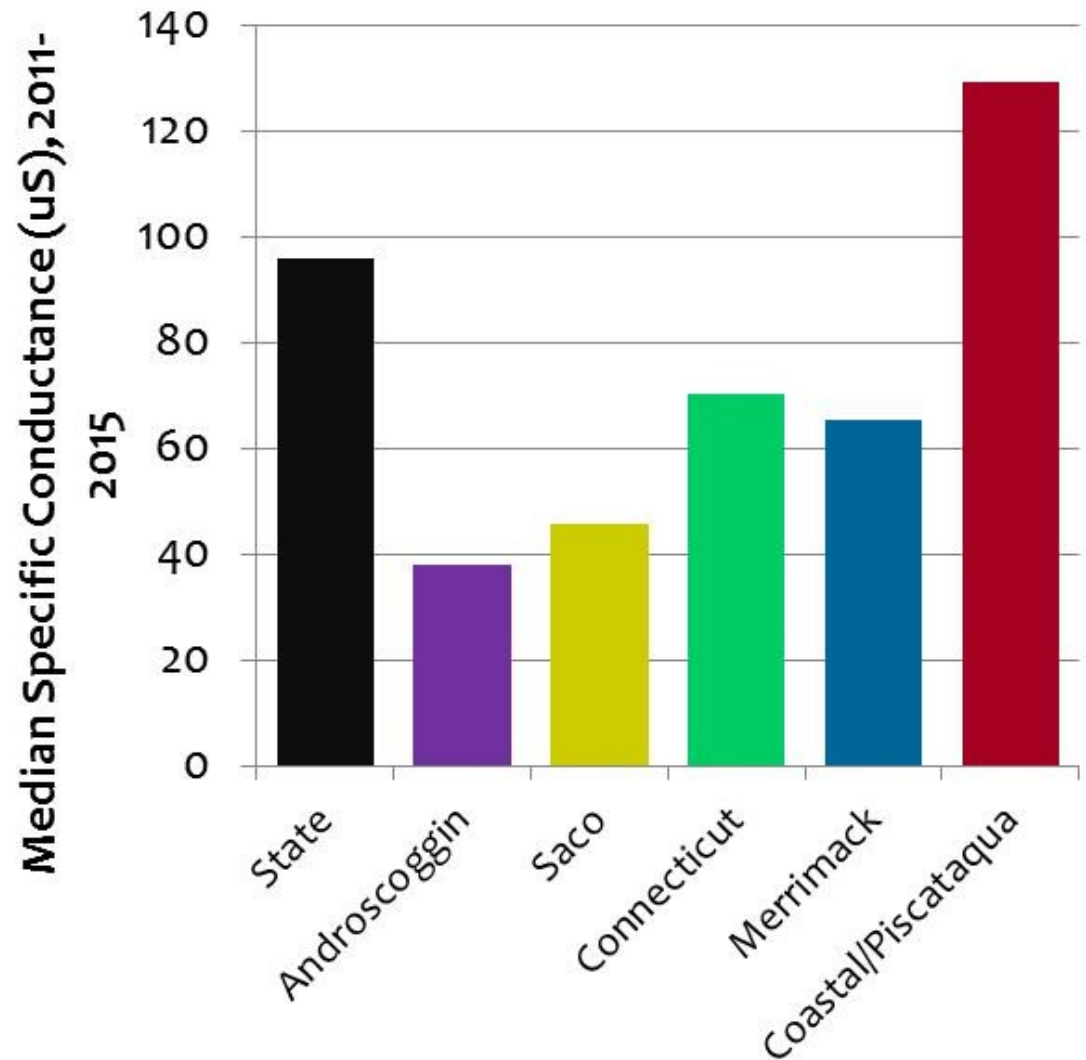
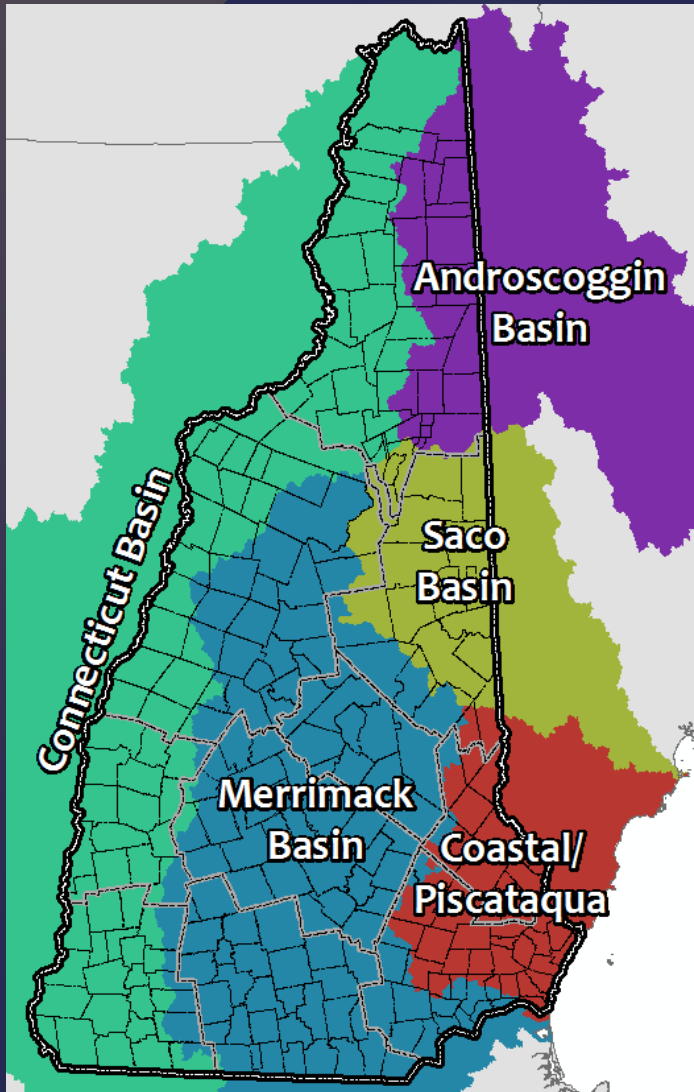
Rivers - Merrimack WS



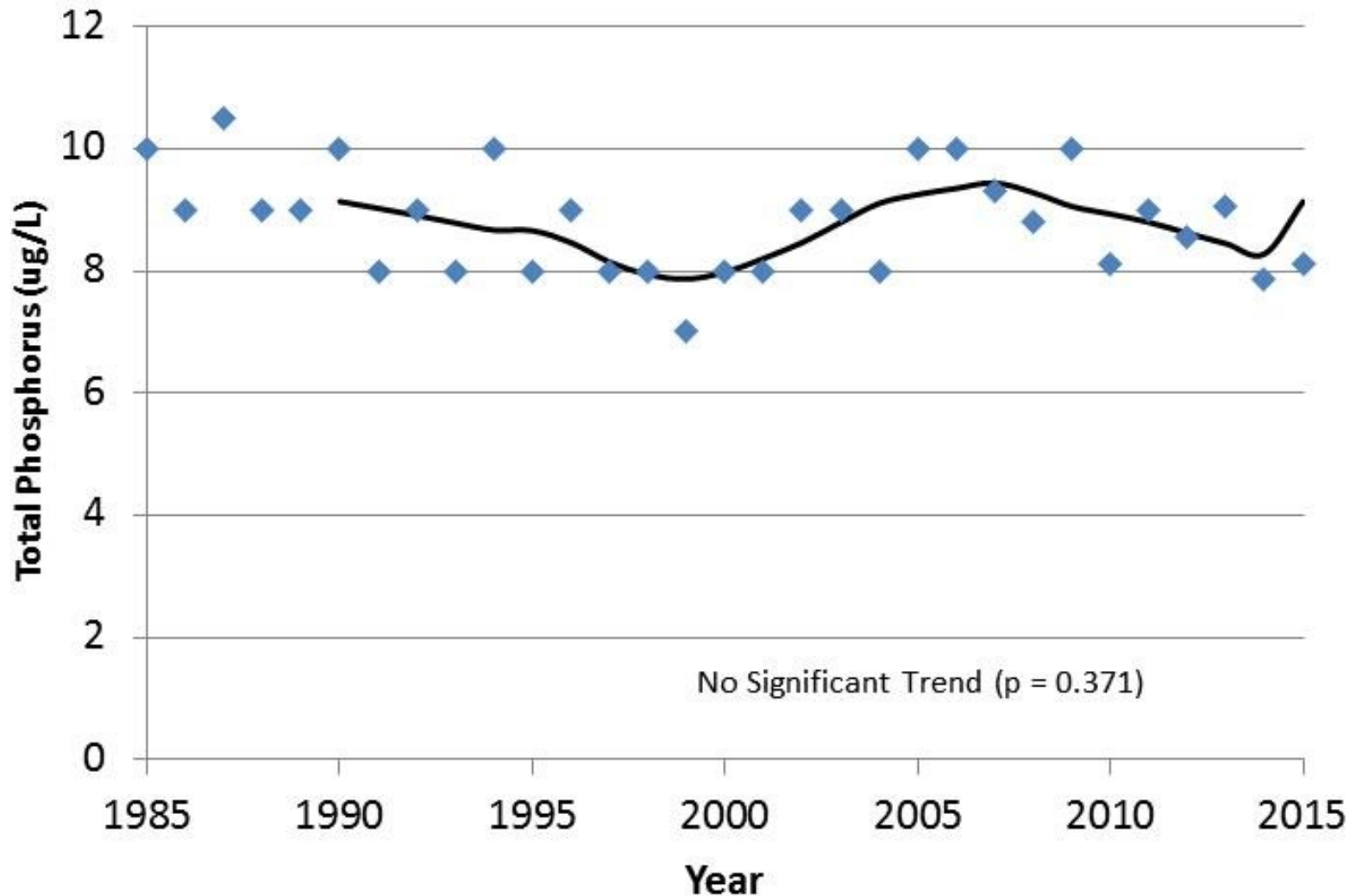
Rivers - Coastal WS



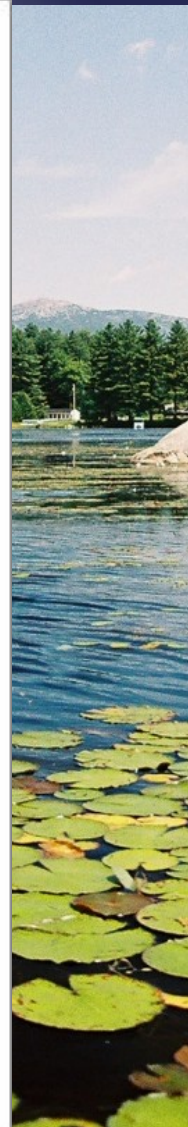
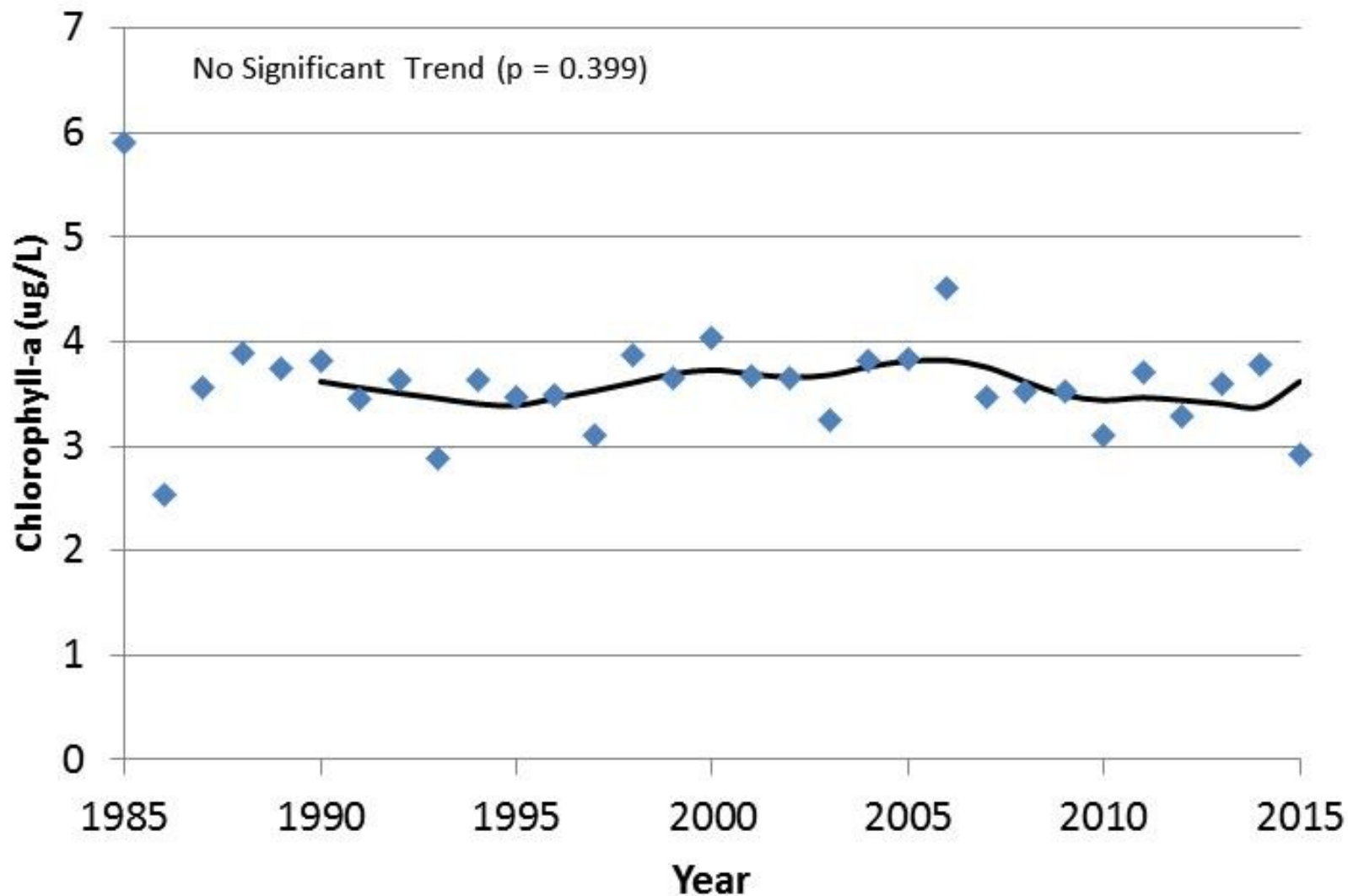
Rivers – 2011-2015 Medians



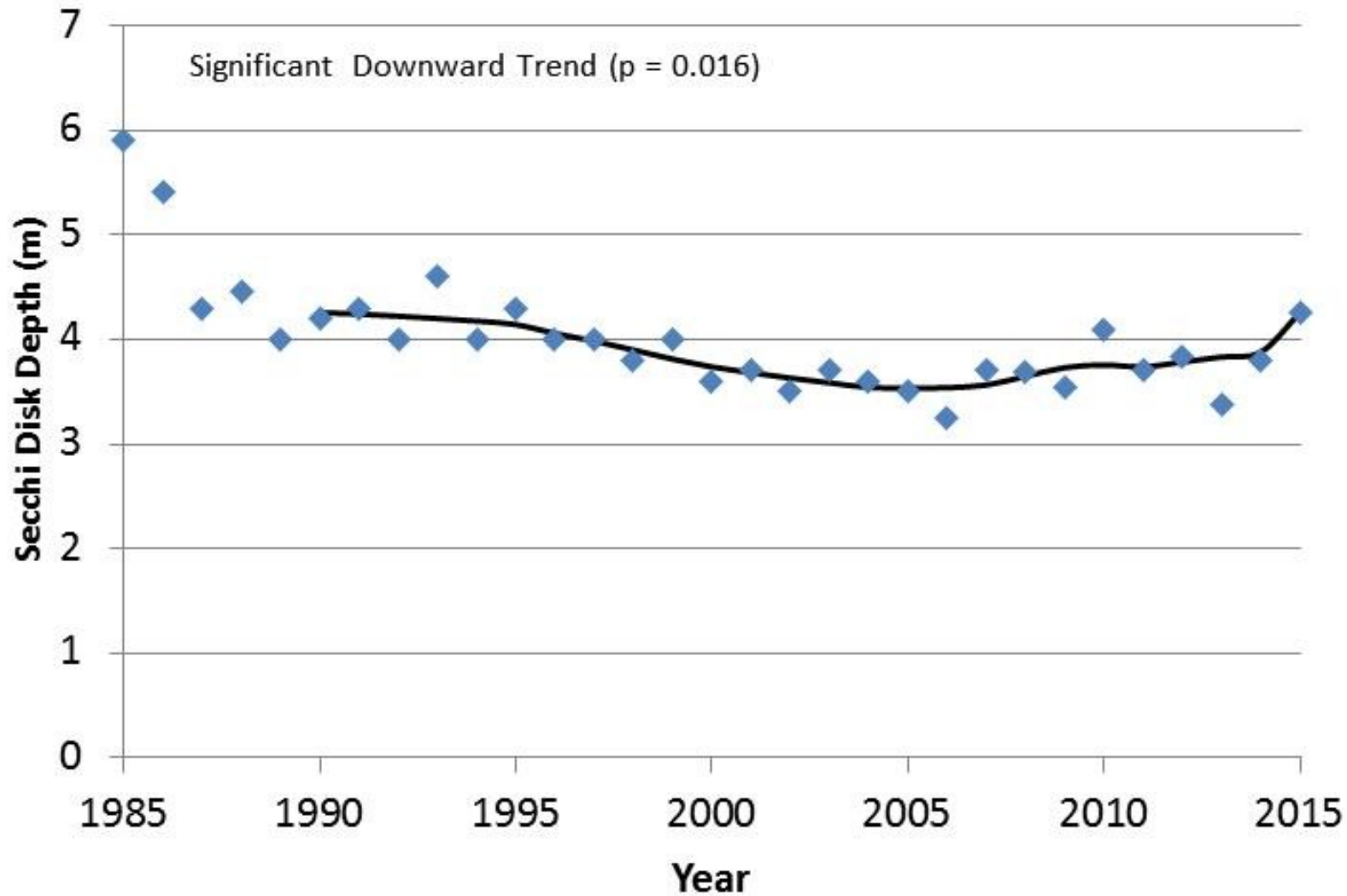
VLAP Lakes – Total Phosphorus



VLAP Lakes – Chlorophyll-a



VLAP Lakes - Transparency

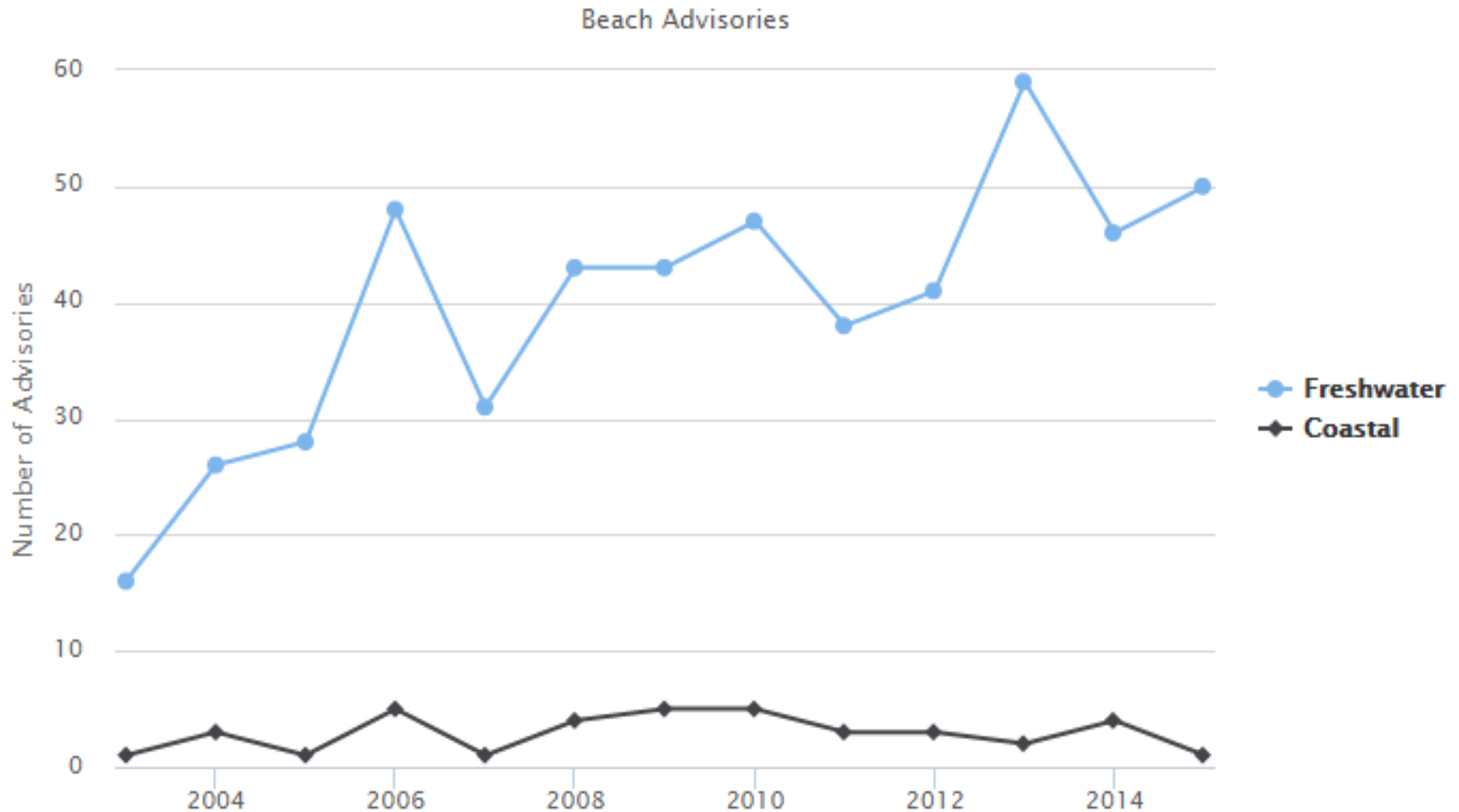


Questions

WARNING!!!

All questions lead to more
questions?

Beaches – Bacteria Advisories



Surface Water Quality Assessments



- Biennial report/List fulfills Federal & State requirements to assess water quality.



- 305(b) = All assessments.
- 303(d) = Impairments that need a Total Maximum Daily Load (TMDL) study.



Surface Water Quality Assessments

- Assessments are governed by the Clean Water Act & NH Water

The
C.A.L.M.



How much data in 2014?

Assessment Units (distinct 'waterbodies')	8,829
Sampling Stations	5,536
Parameters evaluated	187
Waterbody/ Use/Parameter combinations	77,831
Grab samples	1,003,757
Days of datalogger/parameter records	133,051
Water Quality Standard Comparisons	1,961,356

Where is the Aquatic Life data?

	Lake /Pond (by count)	Impoundment (by count)	River/Stream (by size)
Percent with aquatic life use support data	46%	9%	35%



Where is the Swimming data?

	Lake /Pond (by count)	Impoundment (by count)	River/Stream (by size)
Percent with swimming use support data	44%	8%	18%



Where is the Drinking Water data?

	Lake /Pond (by count)	Impoundment (by count)	River/Stream (by size)
Percent with Drinking water use support data	45%	6%	19%



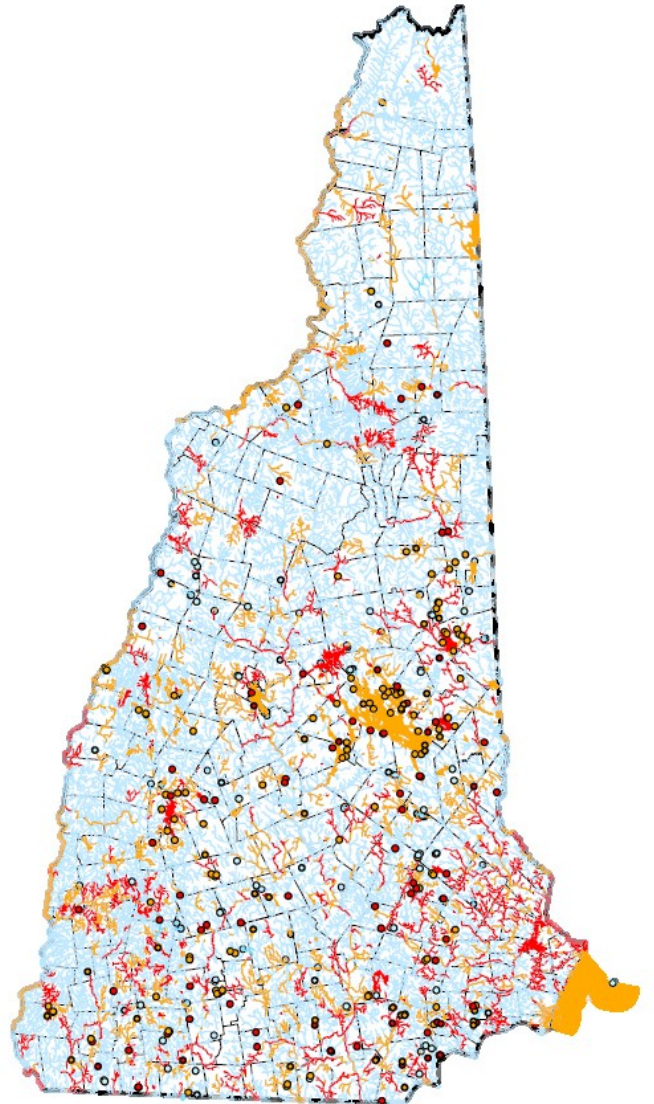
Pollution Sources

Stormwater runoff causes or contributes to over 90% of the water pollution problems in N

Aquatic Life Use



Primary Contact Recreation



What about my Waterbody?



What about my Waterbody?

Surface Water Quality Report Cards



**NEW &
IMPROVED!**

http://www2.des.state.nh.us/WaterShed_SWQA/WaterShed_SWQA.aspx

Report Card Access - Map Tool

NHDES 2014 305(b)/303(d) Data Access with Web AppBuilder for ArcGIS [View short tutorial](#)

About this Assessment viewer

2014 Surface Water Quality Assessment Viewer

This tool was developed for users to,

- 1) see the spatial extend of assessment units,
- 2) see where sampling data was collected,
- 3) access the watershed report cards, and
- 4) run reports to access the water quality data summaries covering the 2006, 2008, 2010, 2012, and 2014 assessment cycles.

[View a short demonstration](#)

For more Surface Water Quality Assessment related information, see the [Surface Water Quality Assessment Website](#)

Find basic station information.

Station ID: PEMMERISL

Station Desc.: PEMIGEWASSET LAKE-ISLAND

Latitude (dd): 43.62

Longitude (dd): -71.60

Station Type: LAKE/POND

Data "Current" in Cycle:

2006: N	2008: N	2010: Y
2012: Y	2014: Y	

[Zoom to](#)

1mi 43.615 -71.600 Degrees i, HERE, DeLorme, USGS, METI/NASA,...

Report Card Access - Map Tool

[Mapping Tool Instructions](#)

[Watershed Report Cards by Assessment Cycle](#)

[Surface Water Quality Assessment Homepage](#)



NHDES 2014 305(b)/303(d) Data Access

with Web AppBuilder for ArcGIS

[View short tutorial](#)



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Launch the
Watershed
Report Card

Esri World Geocoder

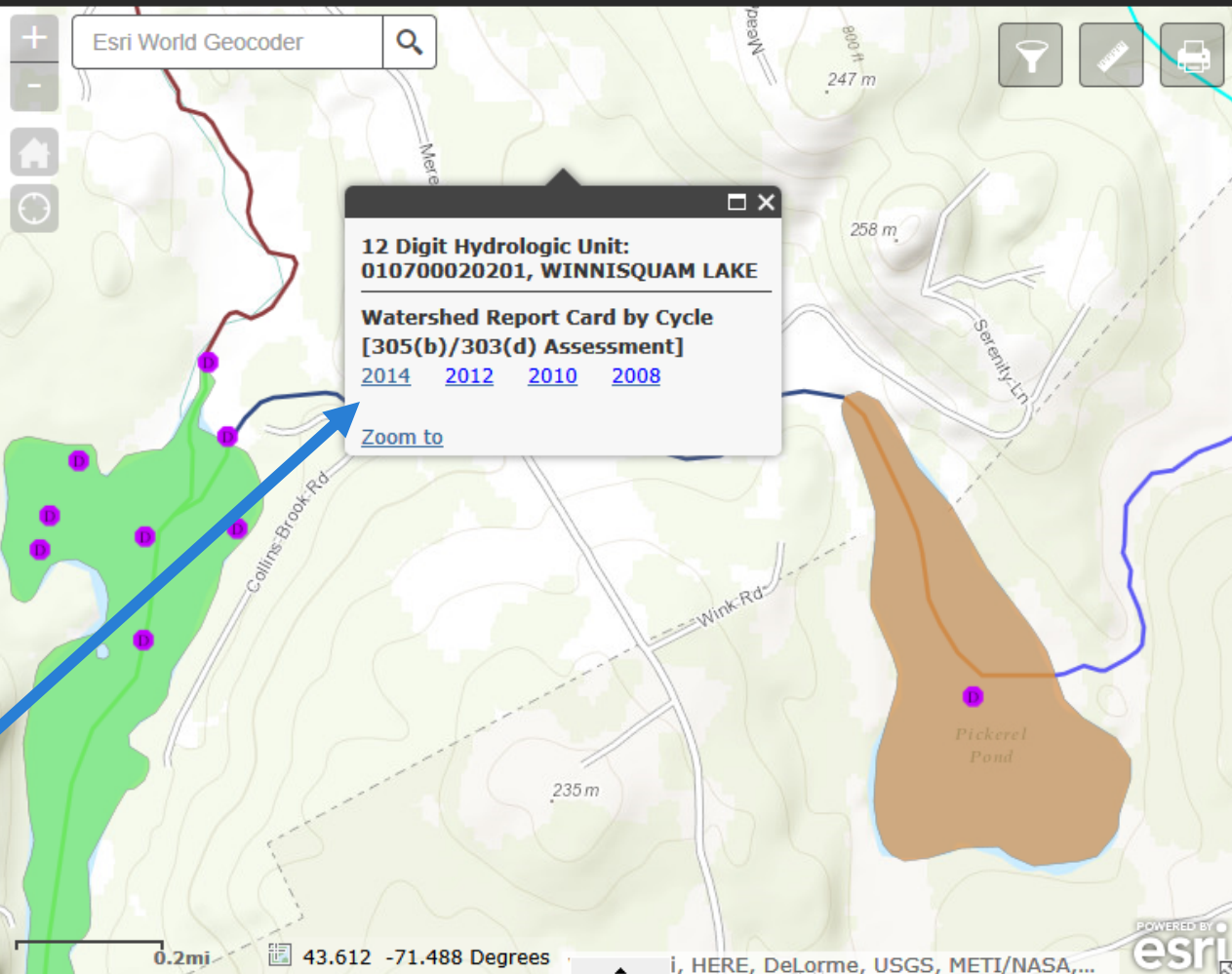


12 Digit Hydrologic Unit:
010700020201, WINNISQUAM LAKE

Watershed Report Card by Cycle
[305(b)/303(d) Assessment]

[2014](#) [2012](#) [2010](#) [2008](#)

[Zoom to](#)



Report Card Access -Map Tool

NHDES 2014 305(b)/303(d) Data Access with Web AppBuilder for ArcGIS [View short tutorial](#)

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summaries covering 2012, and 2014

[View a short](#)

For more Surface Water Quality Assessment information, visit the [NHDES Surface Water Quality Assessment Website](#)

Launch the Watershed Report Card

(1 of 2)

2014 AUID (polygon):
NHLAK700010801-01

AU Name: PEMIGEWASSET LAKE
AU Desc: 010700010801, PEMIGEWASSET LAKE, MEREDITH, 100.5858HA

Watershed Report Cards
[2014](#) [2012](#) [2010](#) [2008](#)

Data Access
[Waterbody Data \(Aquatic Life and Swimming Uses\)](#)

[Zoom to](#)

Map controls: Esri World Geocoder, Map navigation tools, Scale bar, Coordinates: 43.614 -71.600 Degrees, Map data: HERE, DeLorme, USGS, METI/NASA,...

Designated Use Description	Parameter Name	Last Sample	Last Exceed
Aquatic Life	CHLORIDE	2013	NA
	DISSOLVED OXYGEN SATURATION	2013	NA
	OXYGEN, DISSOLVED	2013	NA
	TURBIDITY	2013	NA
	pH	2013	2013
Drinking Water After Adequate Treatment	ESCHERICHIA COLI	2008	2008
	POTASSIUM	2009	NA
	SULFATES	2009	NA
Fish Consumption	Mercury		
Primary Contact Recreation	Escherichia coli	2008	2005
Secondary Contact Recreation	ESCHERICHIA COLI	2008	NA
Wildlife			

Severe Not Supporting, Severe	Poor Not Supporting, Marginal	Likely Bad Insufficient Information - Potentially Full Supporting	No Data No Data	Likely Good Insufficient Information - Potentially Full Supporting	Marginal Full Support, Marginal	Good Full Support, Good
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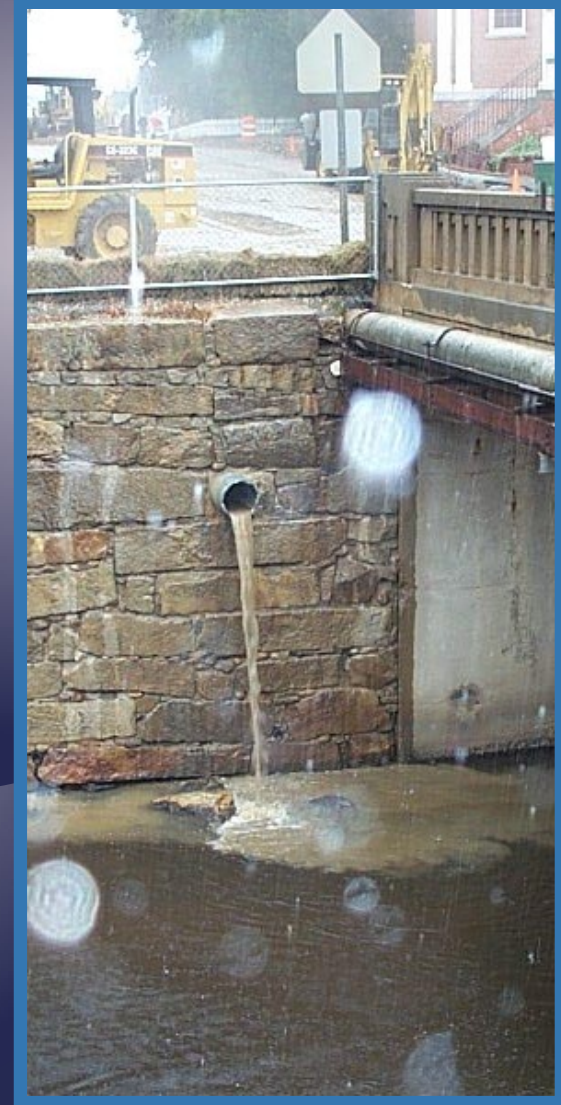
Good at the end of the pipe?

Designated Use Description	Parameter Name	Last Sample	Last Exceed
Aquatic Life	CHLORIDE	2013	NA
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	OXYGEN, DISSOLVED	2013	NA
	TURBIDITY	2013	NA
	pH	2013	2013
Drinking Water After Adequate Treatment	ESCHERICHIA COLI	2008	2008
	POTASSIUM	2009	NA
	SULFATES	2009	NA
Fish Consumption	Mercury		
Primary Contact Recreation	Escherichia coli	2008	2005
Secondary Contact Recreation	ESCHERICHIA COLI	2008	NA
Wildlife			



Assessment Implications

- TMDL may be required
- EPA Permitting - NPDES
- EPA Stormwater Permits Program
 - Multi-Sector General Permit
 - Construction General Permit
 - Small Municipal Separate Storm Sewer System Permits
- Anti-degradation
- 401 Certifications
- Non-Point Source, 319 Funding



Data from water suppliers?



ISSUES



→SALT

→NITRATE

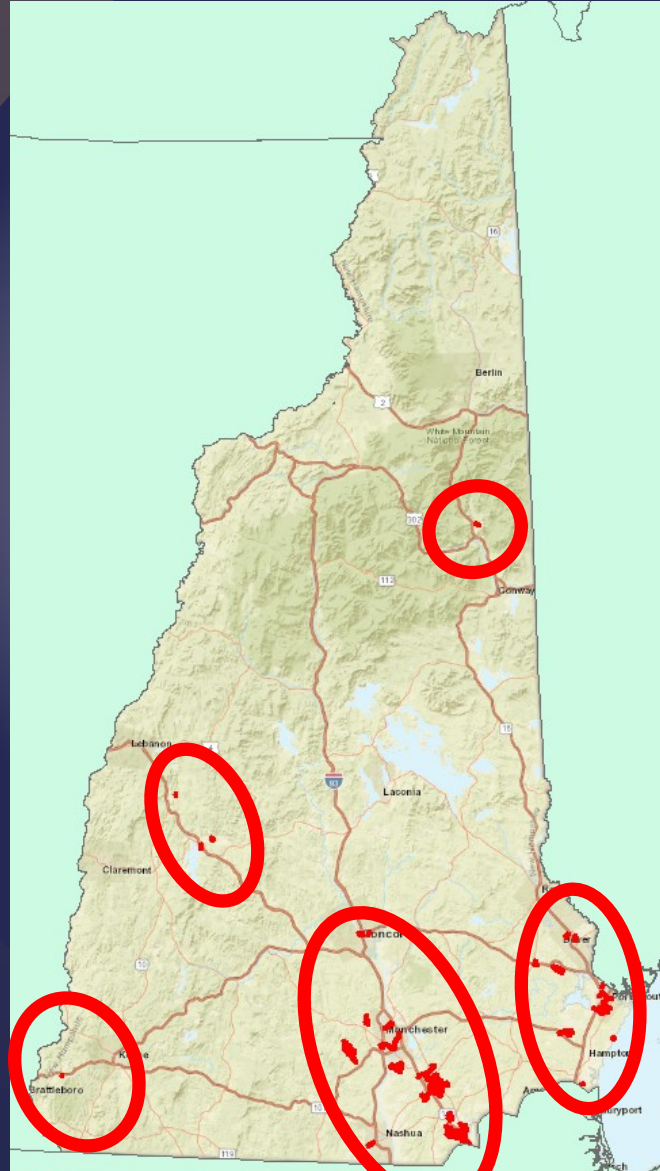
→CYANOBACTERIA

Salt

- Bad for the plumbing's health
- Bad for the environment's health
- Bad for your health



Salted NH Surface Water



47 “known” segments exceed
the Aquatic Life standard;

4 day > 230 mg/L

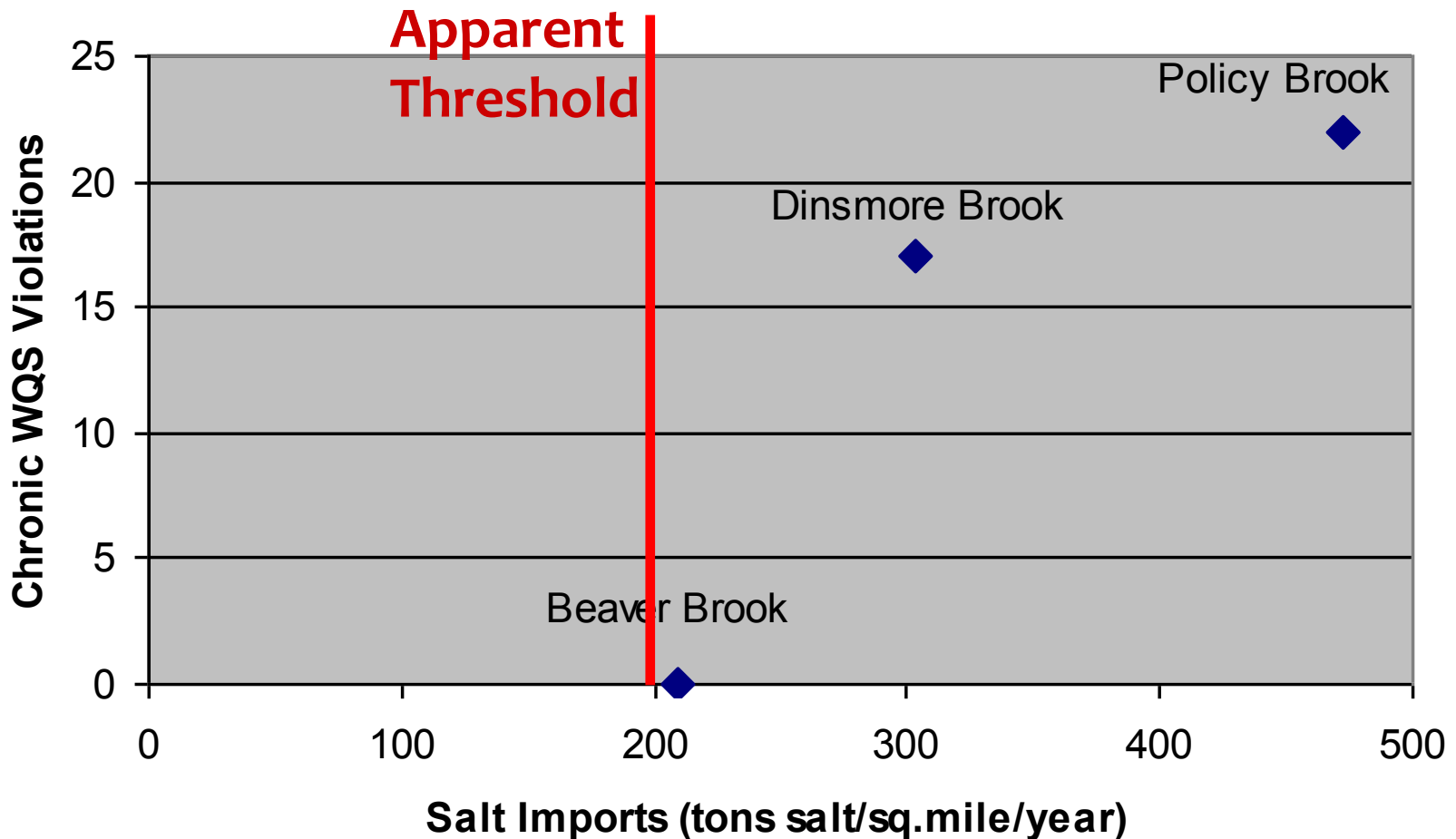
or

1 hour > 860 mg/L

[Drinking water standard
250 mg/L]

Relationship of Salt Imports to Water Quality Violations

Salt Imports vs Chloride WQS Violations in FY07



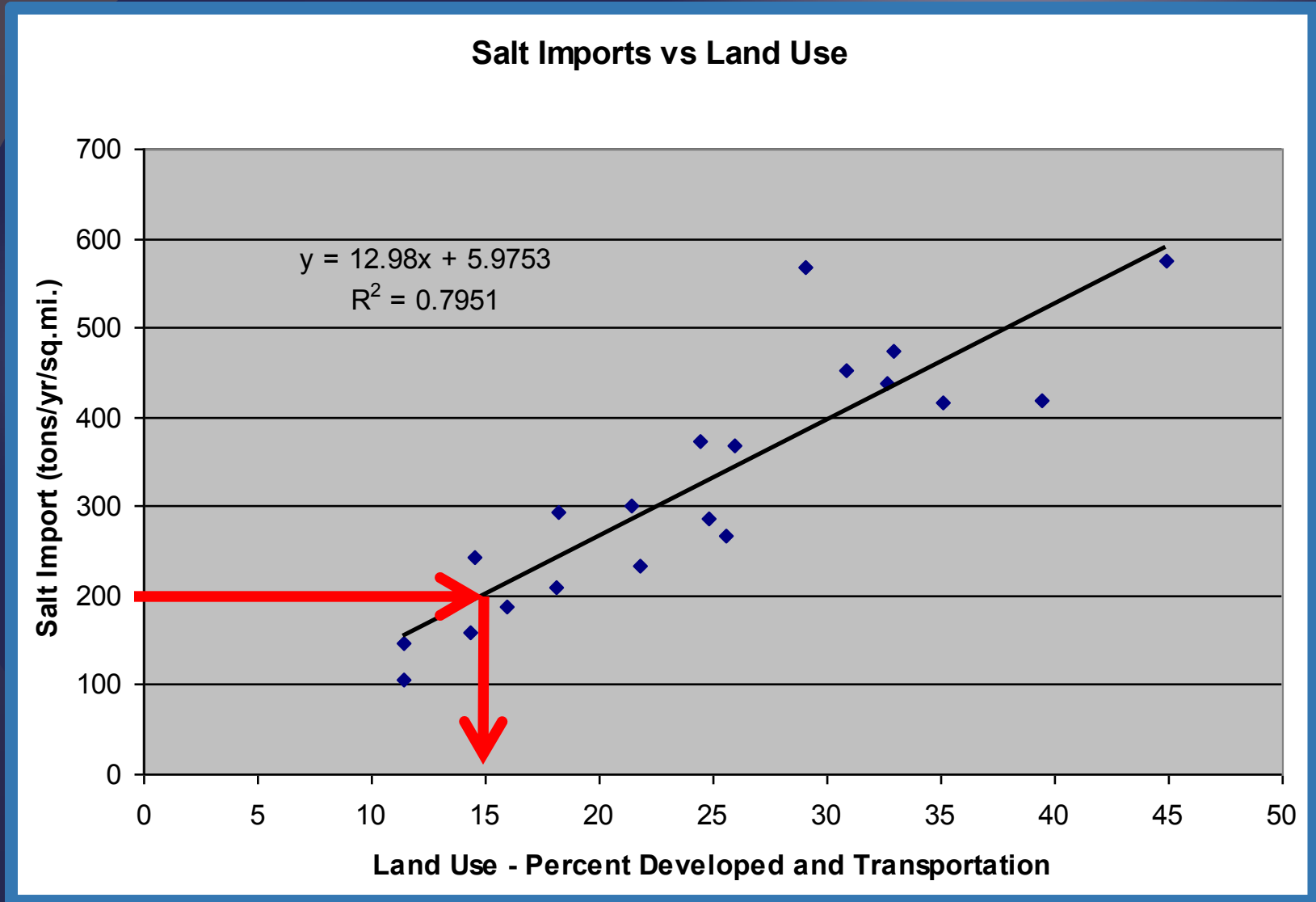
Relationship of Salt Imports to Water Quality Violations



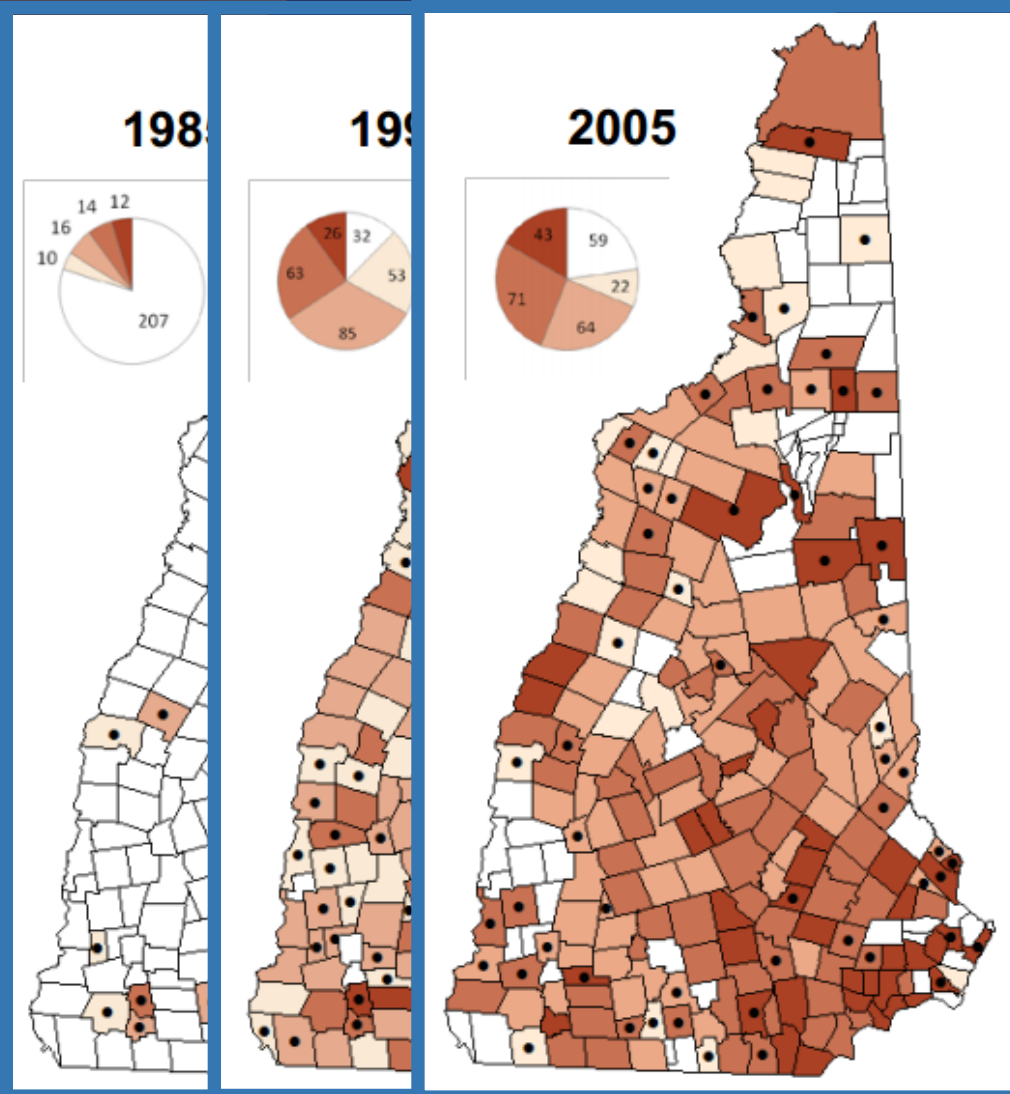
How much salt is that?

Per Year, Per Square Mile

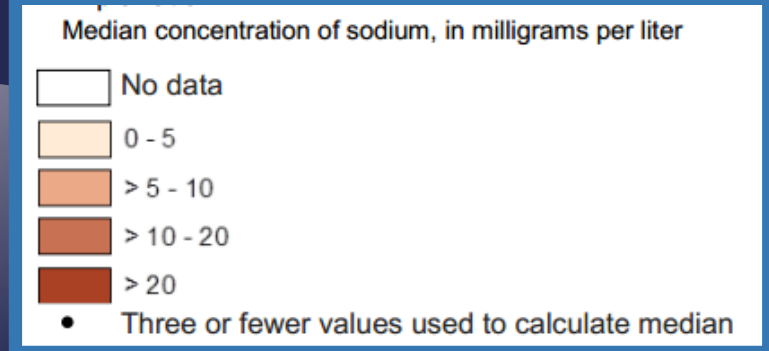
Relationship of Land Use to Salt Imports



Salted NH Groundwater



Temporal and Spatial Trends of Chloride and Sodium in Groundwater in New Hampshire, 1960–2011



Action: Fall Salt Symposium



3rd Annual NH Salt Symposium



“Where Commercial Salt Applicators Come to Learn About Winter Property Management”

Held on September 13 at the Grapponne Center in Concord, NH



Action: Salt Applicator Certification Prog.



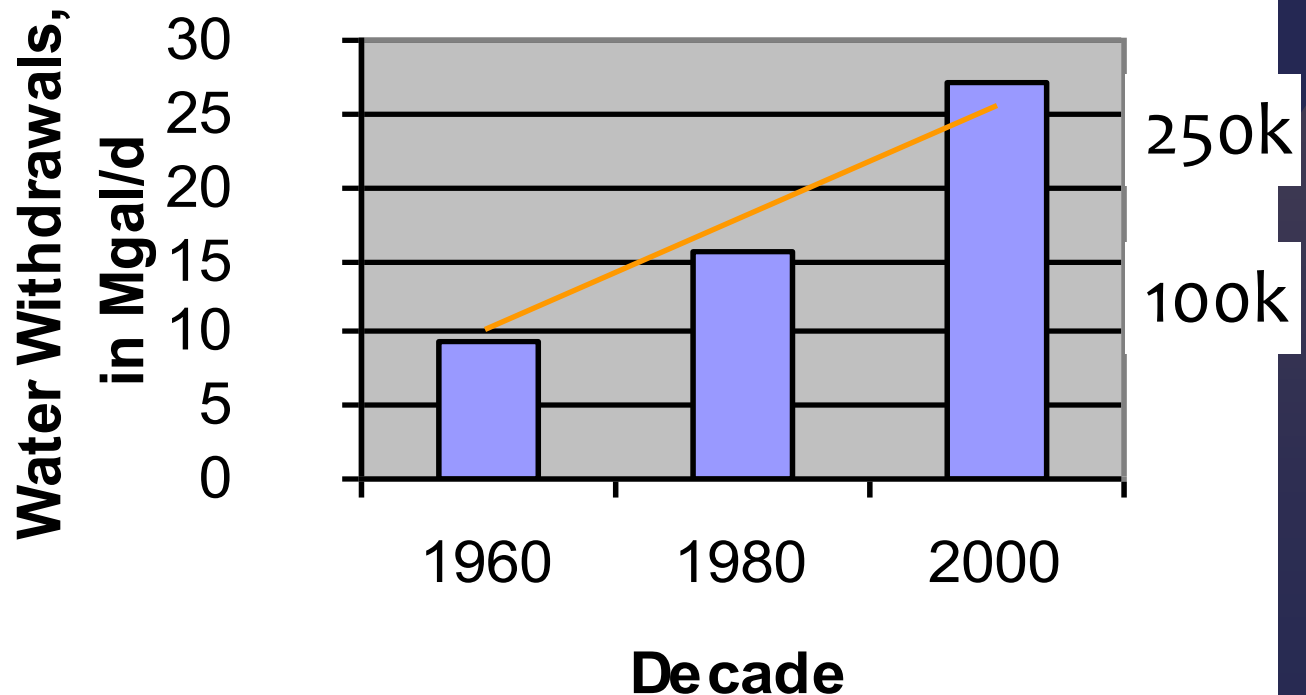
Nitrate



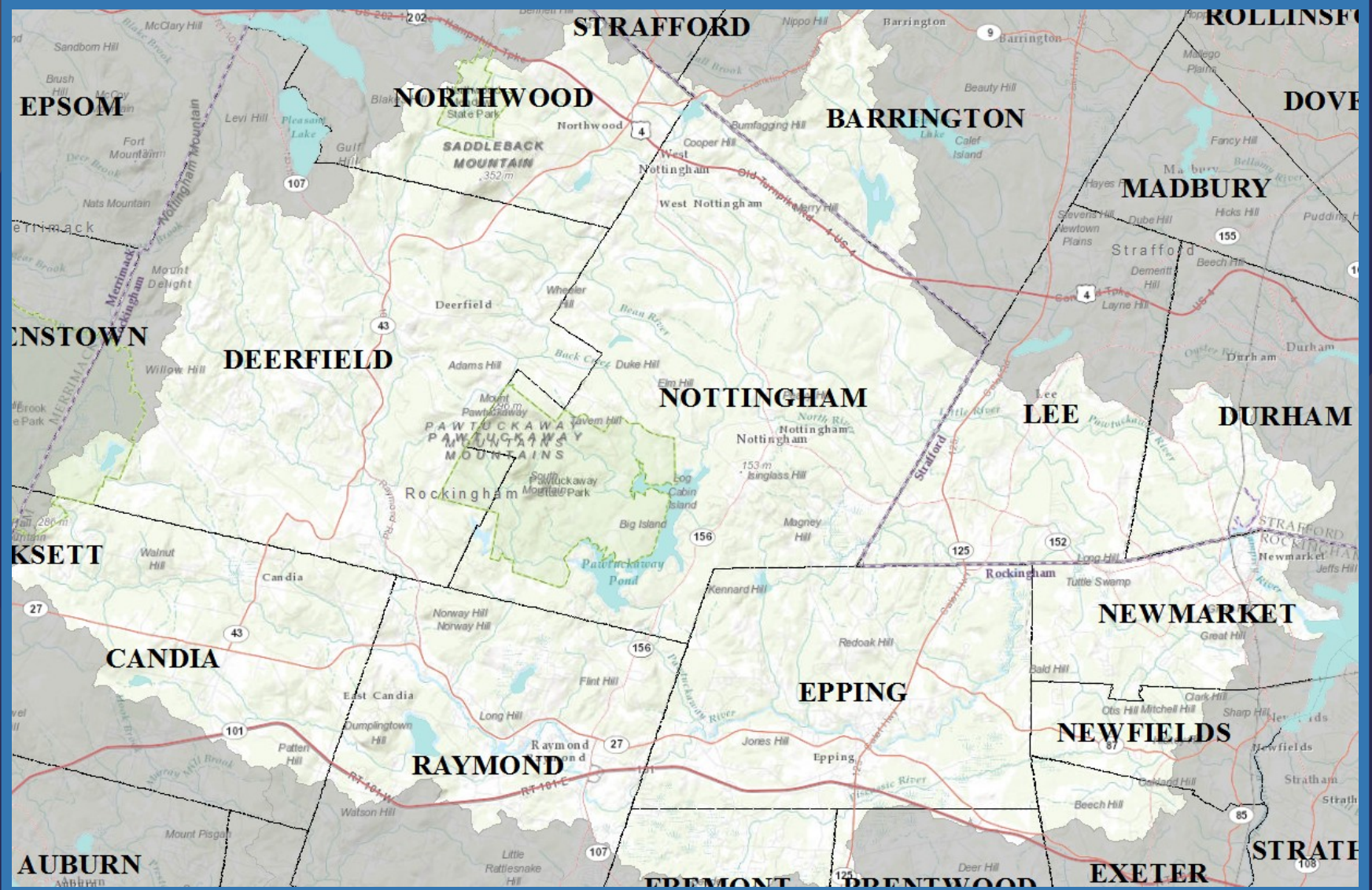
Seacoast Water Resources

- Increasing population
- Increasing demands

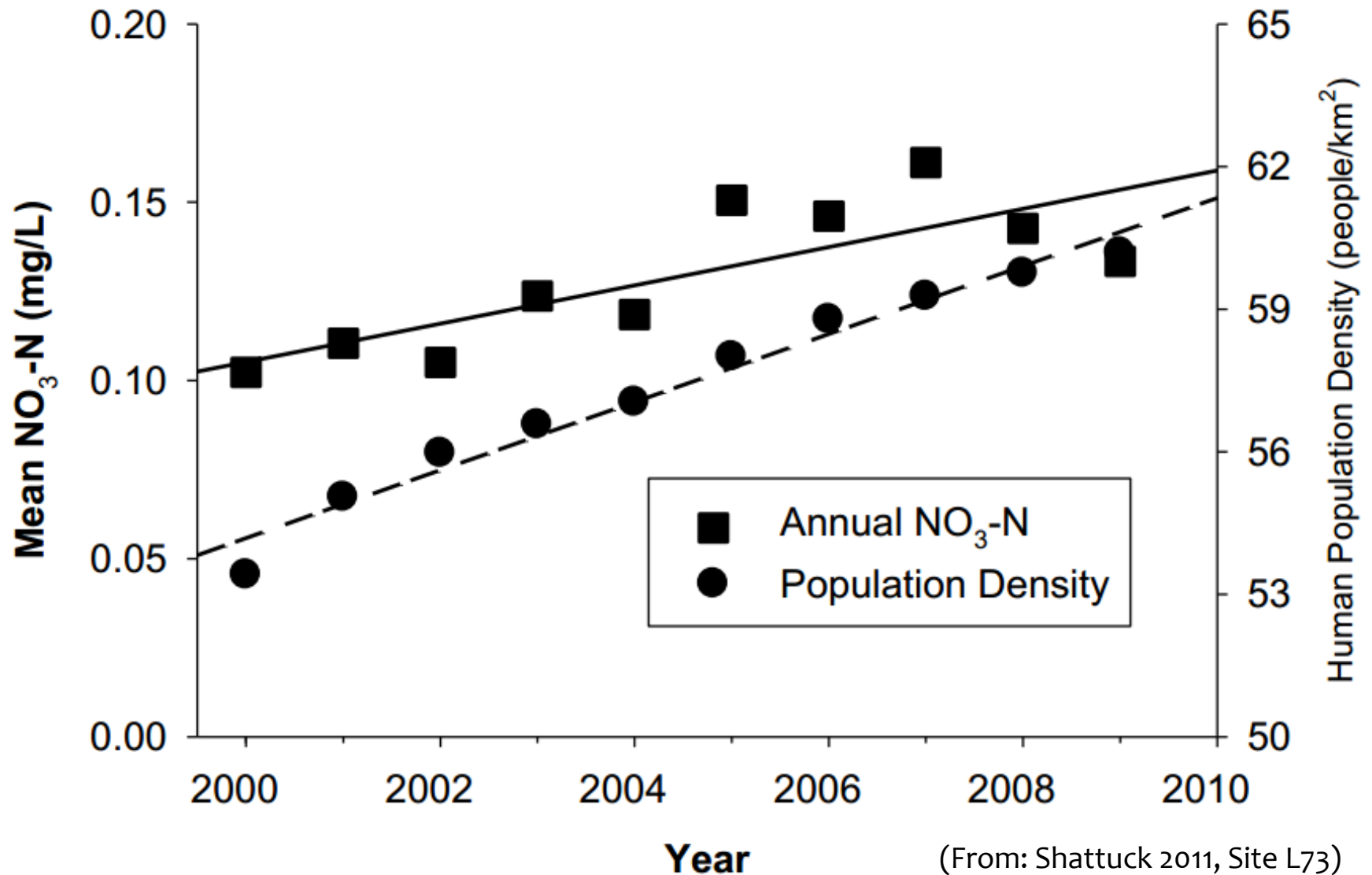
Growth in Water Withdrawals, 1960-2000



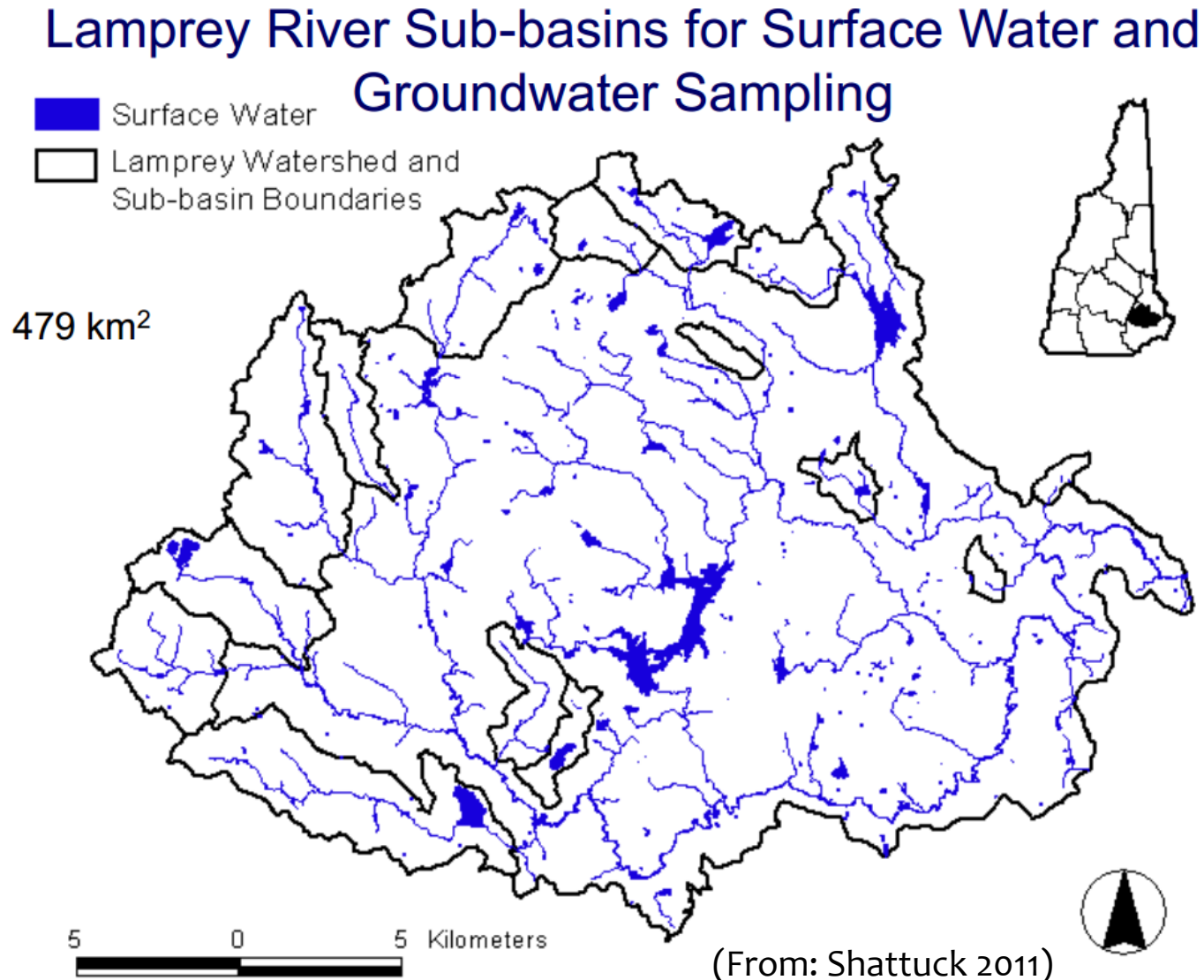
Nitrate Over Time – Lamprey GW



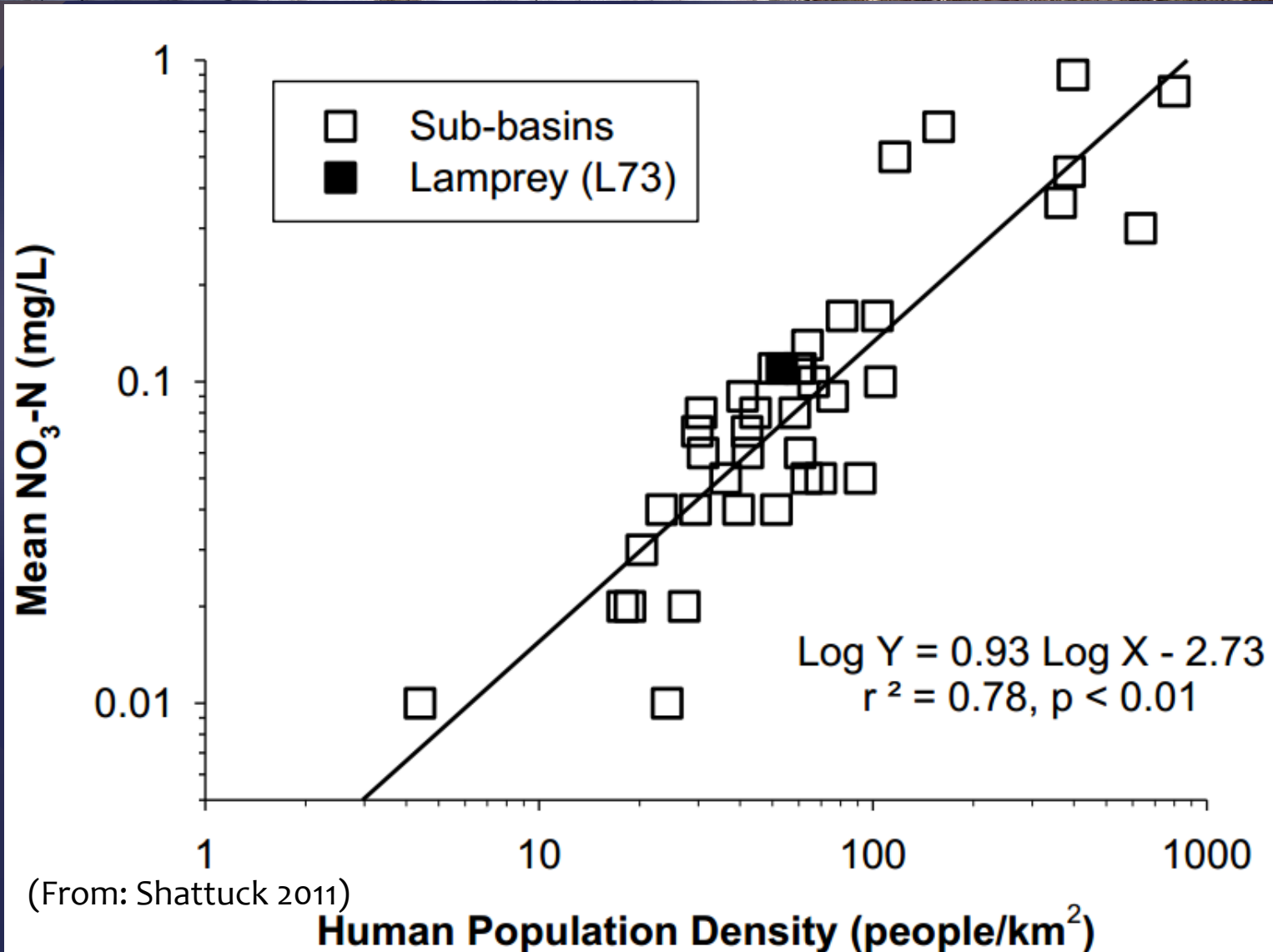
Nitrate Over Time – Site L73



Nitrate - Lamprey Subbasins



Population Drives Nitrate



Maximum Nitrate – Lamprey GW

➤ Homeowner Well Samples

➤ 15% > 2 mg N/L

➤ 5% > 4 mg N/L

➤ (Gastric Cancer Risk – Ward et al. 1996)

➤ One well > EPA MCL (10 mg N/L)

Cyanobacteria



Cyanobacteria Basics

- Single cell organisms
- Toxins harm liver, nerves, and skin
- ALS (*under investigation*)
- Many cases of drinking water causing illness
- Cattle, sheep, dogs, and waterfowl died

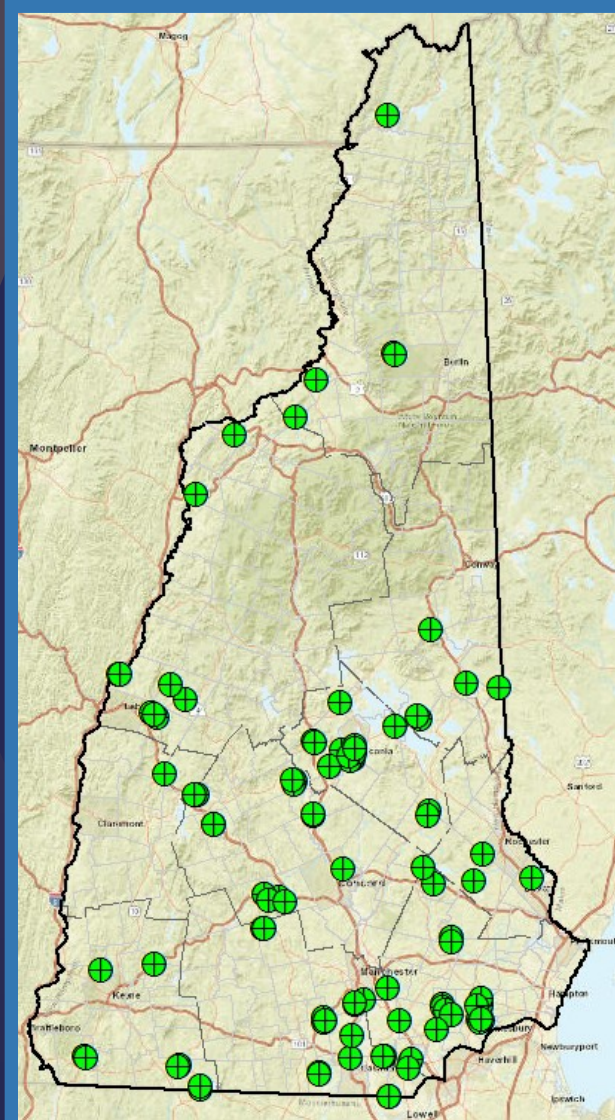


Cyanobacteria Terms

- Chlorophyll-a (*the green part*)
- Phycocyanin (*the light blue part*)
- Common NH Cyanobacteria
 - Anabena
 - Microcystis
 - Cylindrospermopsis
- Types of Cyanotoxins
 - Anatoxin
 - Microcystin
 - Cylindrospermopsin



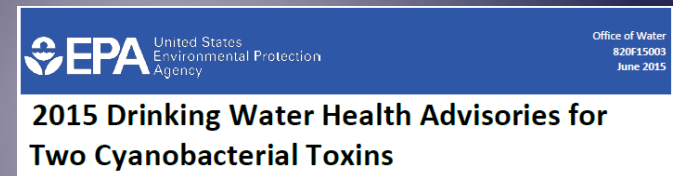
Where have there been blooms?



EPA Documents

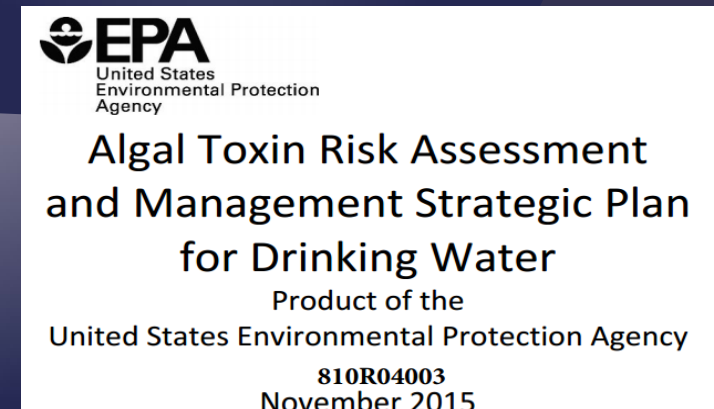
Factsheet

- “2015 Drinking Water Health Advisories for Two Cyanobacterial Toxins”, June 2015 (Doc # 820F15003)



Testing Recommendations

- “Algal Toxin Risk Assessment and Management Strategic Plan for Drinking Water” November 2015 (Doc #810R04003)
 - **Microcystin**
 - **Cylindrospermopsin**



EPA Tool Options

Waterbody
management
component

Threat
Identification

Educational
component
& watchers

Cyano
Monitoring

Cyano Scope

Bloom Watch!

COST \$\$

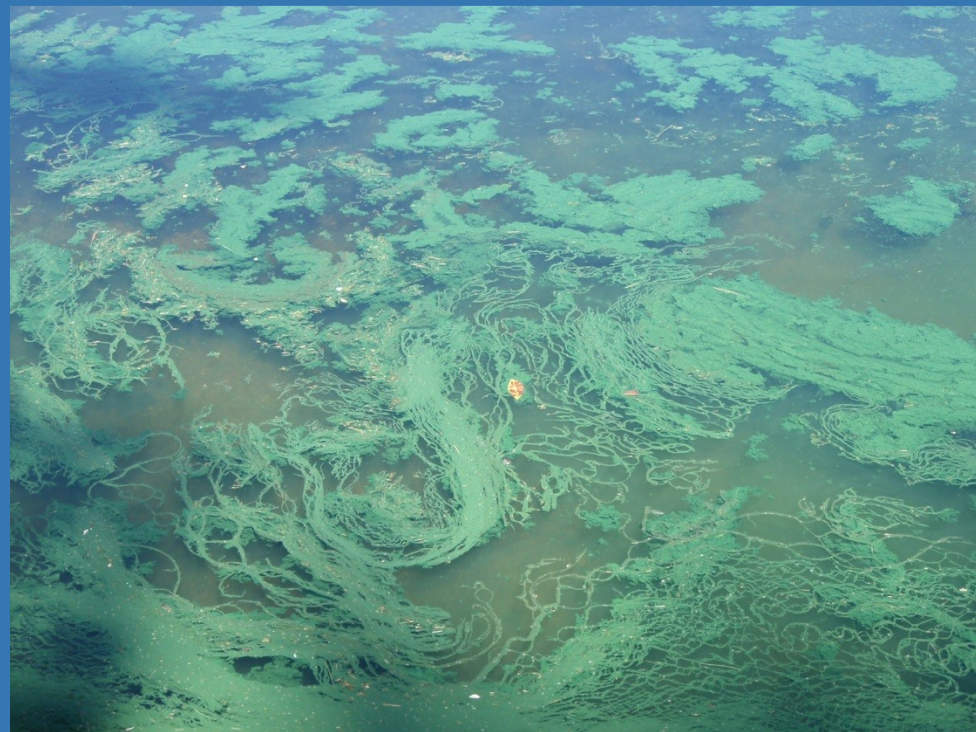
Training and Expertise




Quality Assurance

Data/Information

EPA – Bloom Watch!

To determine the spatial and temporal patterns of bloom occurrence in the region





bloomWatch

INFORMATION

PHOTO CAPTURE


SUBMIT

Latitude:

Longitude:

GET COORDINATES

Photo 2: Attempt to capture a photo from standing position to the water a distance of 10-30 feet. If additional description is necessary enter it in the box below.



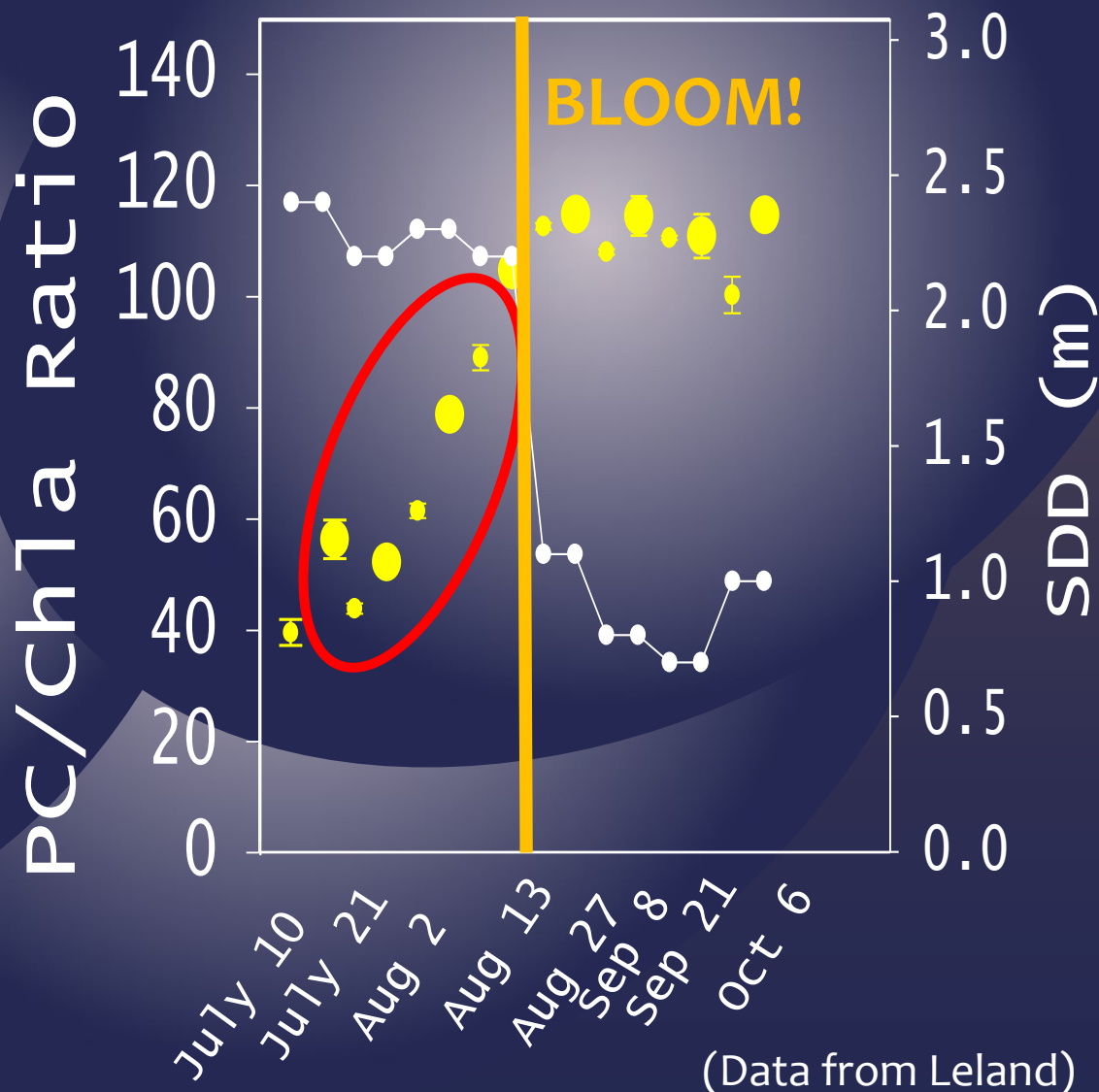
EPA –Cyano Scope

- Determine the Occurrence and Distribution
- Genus/Species
- Assess Potential Toxicity



EPA – Cyano Monitoring

- Track Concentrations
- Efforts to Forecast Blooms
- Determine Risk
- Assess Toxicity



EPA Outreach

New Outreach Efforts

- Training modules
- YouTube tutorials
- Mobile lab training roadshow in 2016



NHDES Services

- **NHDES Cyanobacteria Hotline: 419-9229**
- Chlorophyll-a
- Phycocyanin
- Microscopic ID (Species/Counts)
- Exploring new testing (2016)
 - Enzyme-Linked Immunosorbent Assays (ELISA)
 - Liquid Chromatography / Mass-Spectrophotometer



Plan ahead in case all else fails?

ENVIRONMENTAL Fact Sheet



NEW HAMPSHIRE
DEPARTMENT OF
Environmental
Services

29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

WD-DWGB-4-15

2009

Cyanobacteria and Drinking Water:
Guidance for Public Water Systems

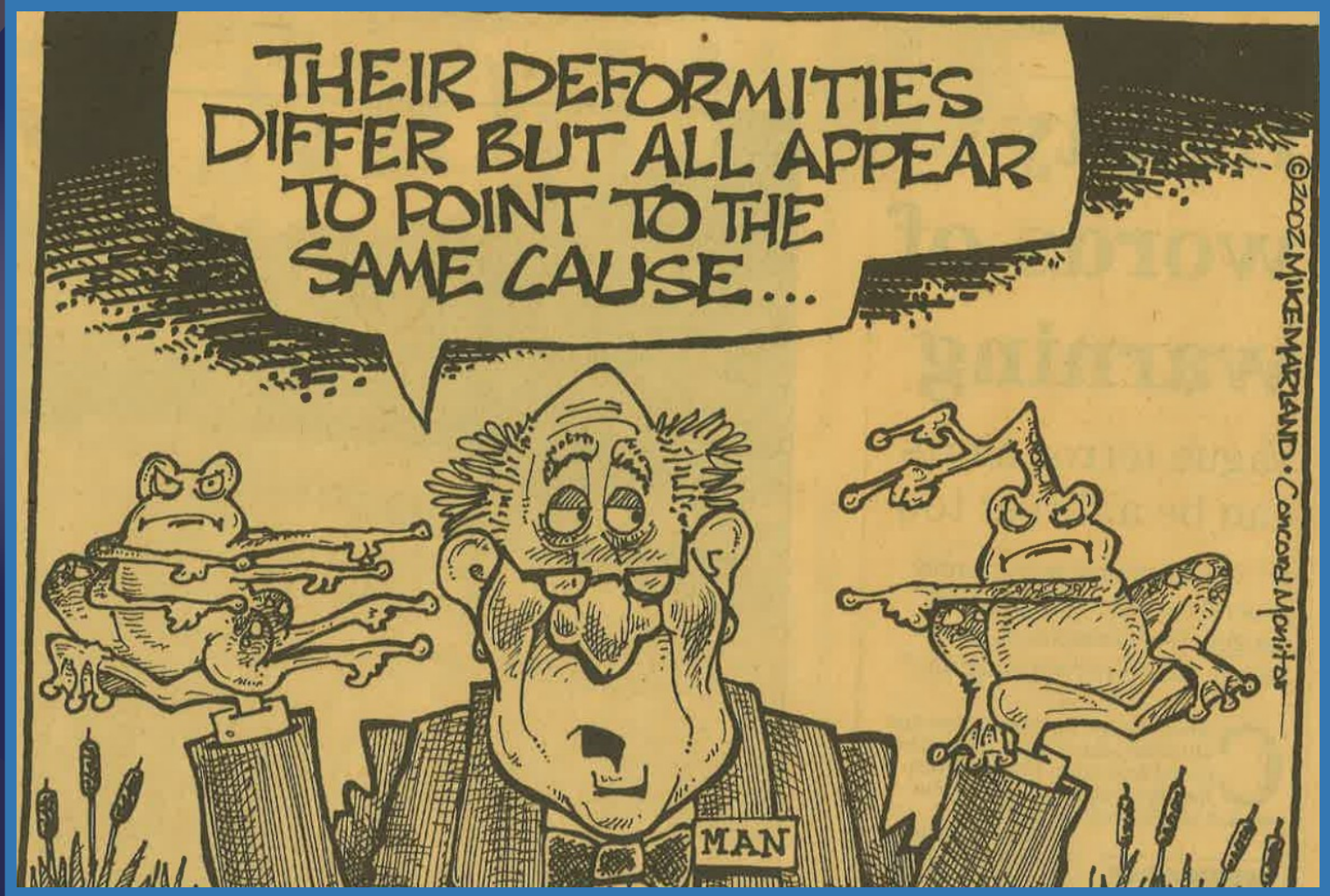
NHDES Rapid
Response
Protocol
Coming Soon



Recommendations for Public Water Systems to Manage Cyanotoxins in Drinking Water

June 2015

Rib-bit



Episode IV

A NEW HOPE

LEVERAGE

TOOLS

WATERSHED BASED PLANS

EXAMPLE COLLABORATIVE SUCCESS

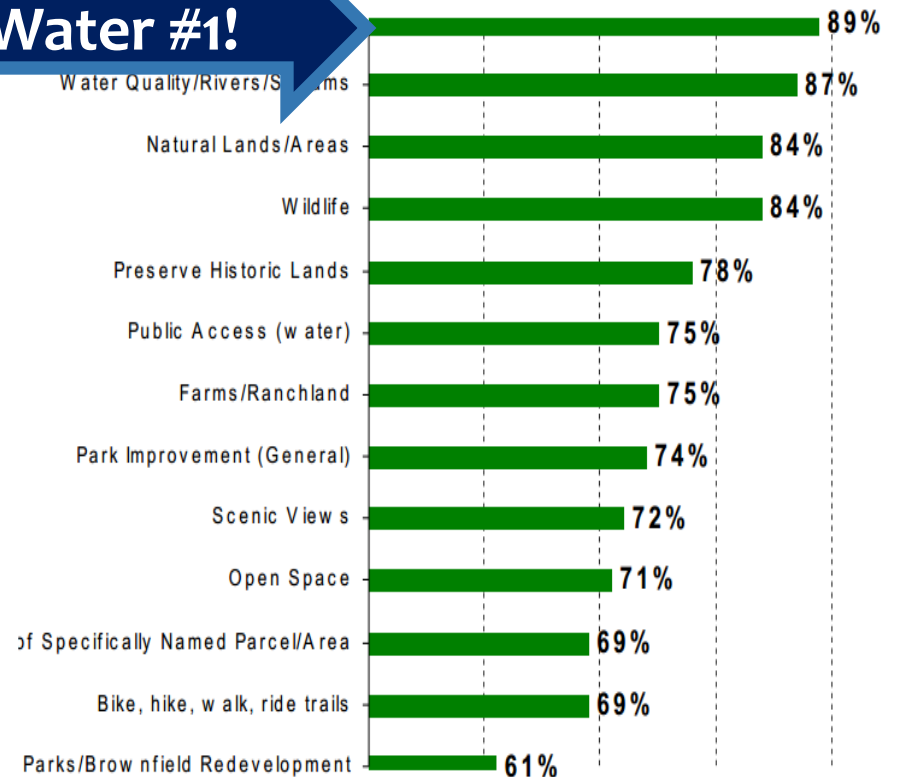
You Have Leverage Nationally

Drinking Water #1!

Drinking Water is Popular:

- In 2012, voters passed 81% of local measures for land conservation to protect drinking water. Measures approved bonds or tax increases, raising an estimated \$767 million.

Voter Support for Conservation Purposes



You Have Leverage in NH

Water Quality Protection#1!

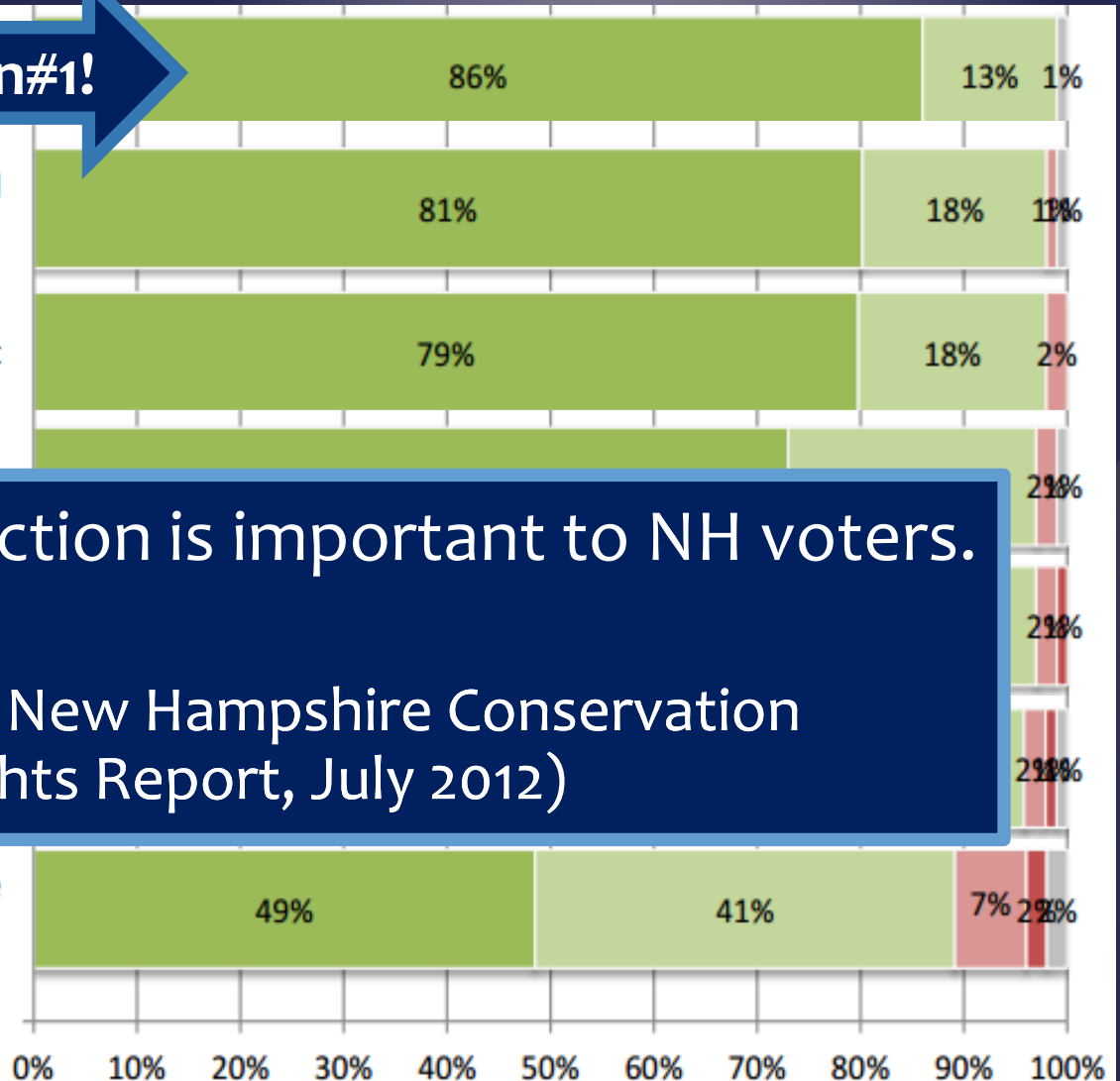
Preserving our forest land and working forests

Preserving wildlife habitat

Improving and expanding state parks

Water Quality Protection is important to NH voters.

(Trust for Public Lands; New Hampshire Conservation Attitude Survey Highlights Report, July 2012)



You Have Economics Leverage

Return on Investment:

- \$1 of protection SAVES \$27 in treatment costs.

\$27

\$1

(Winiecki, E., 2012. Economics and Source Water Protection.)

Toolkit

Clean Water
Act (CWA)



Safe Drinking
Water Act
(SDWA)

OPPORTUNITIES TO PROTECT DRINKING WATER
SOURCES AND ADVANCE WATERSHED GOALS
THROUGH THE CLEAN WATER ACT

November 2014

Published by: Association of State Drinking Water Administrators

Toolkit - Contents

iii. Introduction

Safe Drinking Water Act and Clean Water Act Fundamentals
Coordinating CWA and SDWA Implementation
Quick Start to Coordination

I. Using Water Quality Standards

II. Using Monitoring, Assessment, and Impaired Waters Listings

III. Using Total Maximum Daily Loads

IV. Using National Pollutant Discharge Elimination System programs

V. Using Nonpoint Source and Clean Water Act 319 Programs

Introduction
Background
Desired Outcomes and Opportunities
Additional Resources

Toolkit - Examples

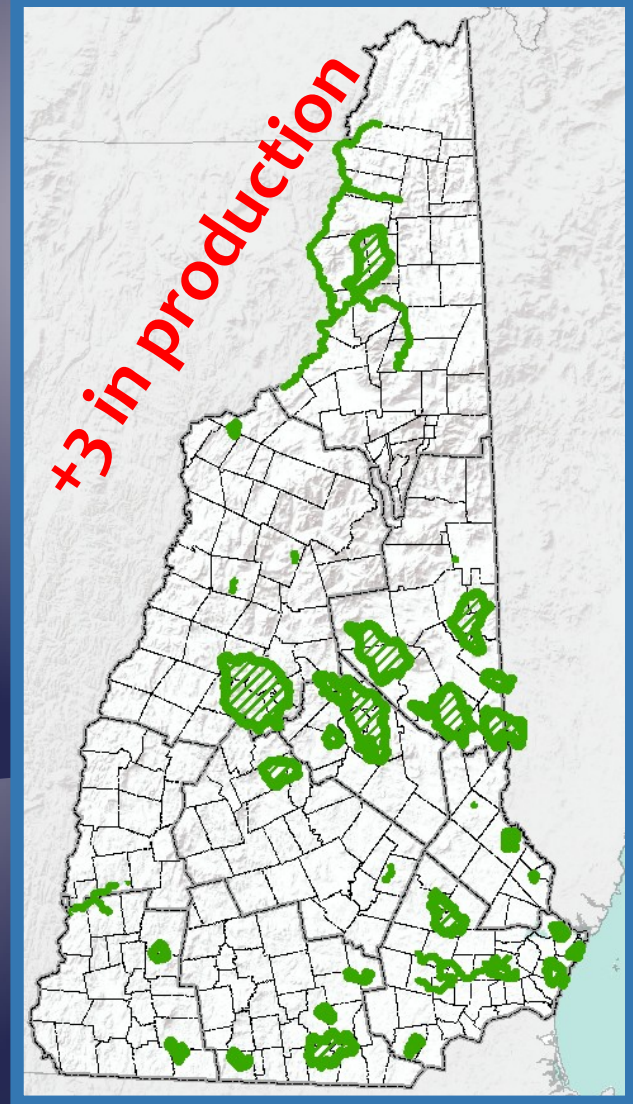


Appendix B

State-Specific Examples of Protecting Water Quality and Sources of Drinking Water

NH Watershed Based Plans

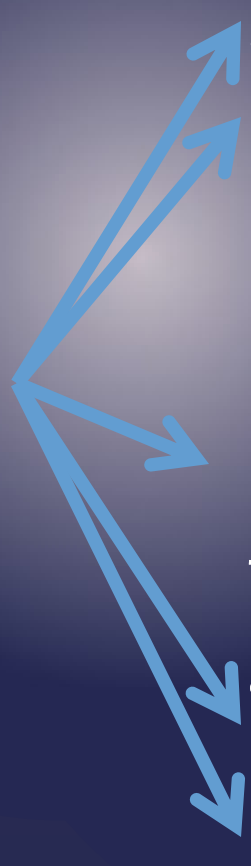
- Restoration Plans
- Protection Plans
- NHDES, Watershed Assistance Section → Publications → Plans
(http://des.nh.gov/organization/divisions/water/wmb/was/watershed_based_plans.htm)




Watershed Based Plans

Nine Steps to Success (“a-i”)


Water
Quality
Data

- 
- The diagram shows a central point on the left labeled 'Water Quality Data'. From this point, nine blue arrows branch out to the right, each pointing to one of the nine steps listed. The steps are labeled 'a)' through 'i)' and include specific terms highlighted in yellow.
- a) ID your pollution **causes and sources**
 - b) Estimate the **pollutant reductions** needed
 - c) What **actions** are needed to reduce pollutants
 - d) **Cost and authority**
 - e) **Outreach and Education**
 - f) **Schedule**
 - g) **Milestones**
 - h) Success **indicators and evaluation**
 - i) **Monitoring** plan

Watershed Planning Resources

- 
- “NHDES” funding,
 - NHDES Watershed Assistance Section Nonpoint Source grants (section 319) and,
 - Planning Grants through Regional Planning Commissions (section 604).
 - Source Water Protection Program
 - EPA and NHDES can provide technical assistance and support.
 - Additional funds and resources...

Additional Resources/Partners

- 
- NH Conservation License Plate (Moose Plate) Program
 - State: Fish and Game Dept., DOT, and others
 - Federal: USDA/NRCS, NOAA, and others
 - Regional planning commissions
 - Municipalities
 - Universities
 - etc.

Example: Lake Waukewan

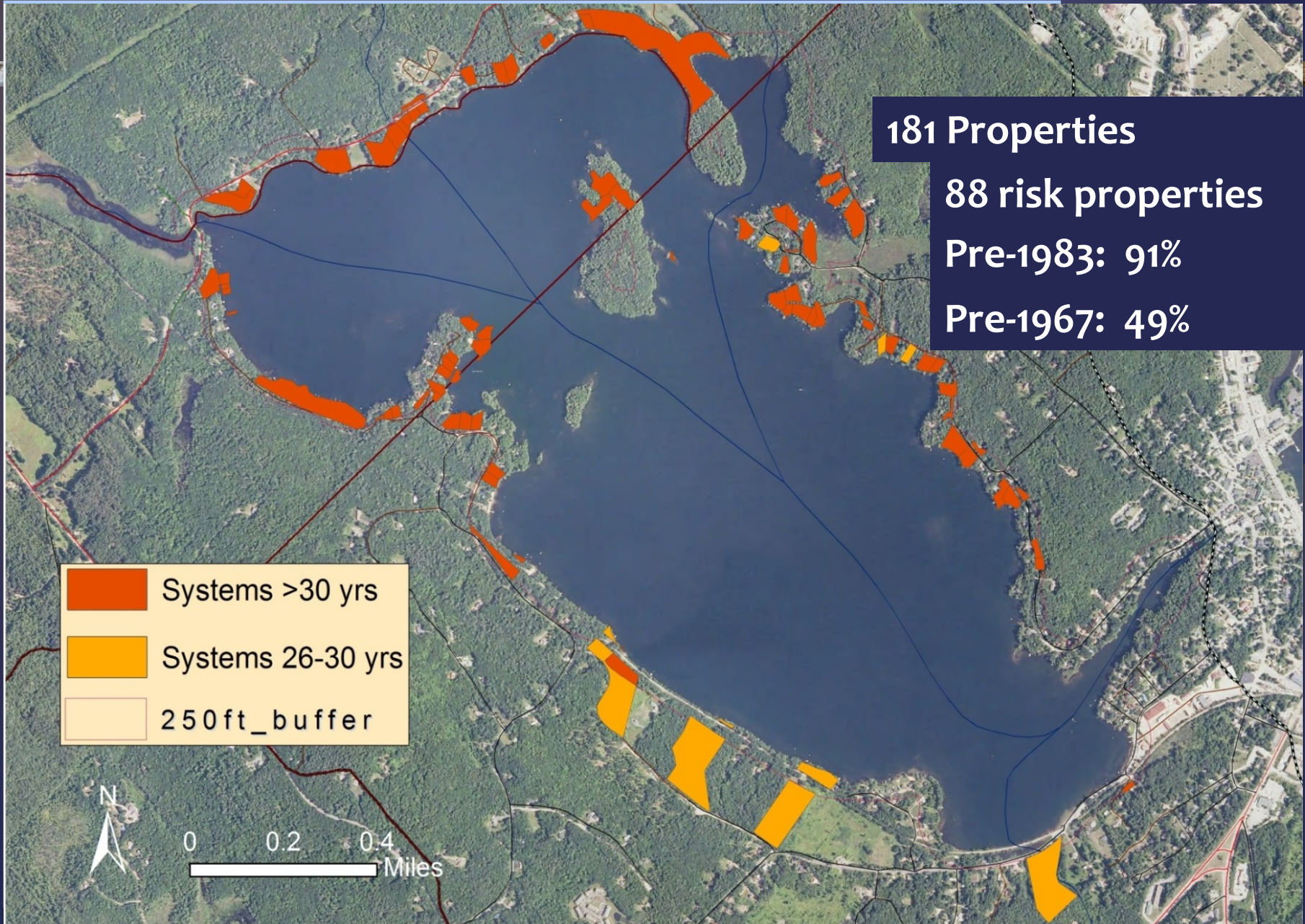
- Meredith Water Supply
- Supply to 3,000 +/- residents plus businesses
- Recreational resource



2005: Watershed Management Plan

Funded through NHDES Watershed Assistance Section Nonpoint Source grants (section 319)

Septic System Risk Analysis (2009)



1st Phase: Evaluation and Certification

- Funded through the Source Water Protection Program
- Voluntary Cost Share Program – 50/50
- Who had eligible properties?
 - New Hampton, Center Harbor, and Meredith properties located within 250 feet of lake
 - Systems over 25 years in age
 - No operational approval on file



Evaluation Results

24 evaluations performed

13 systems found in failure (54%)

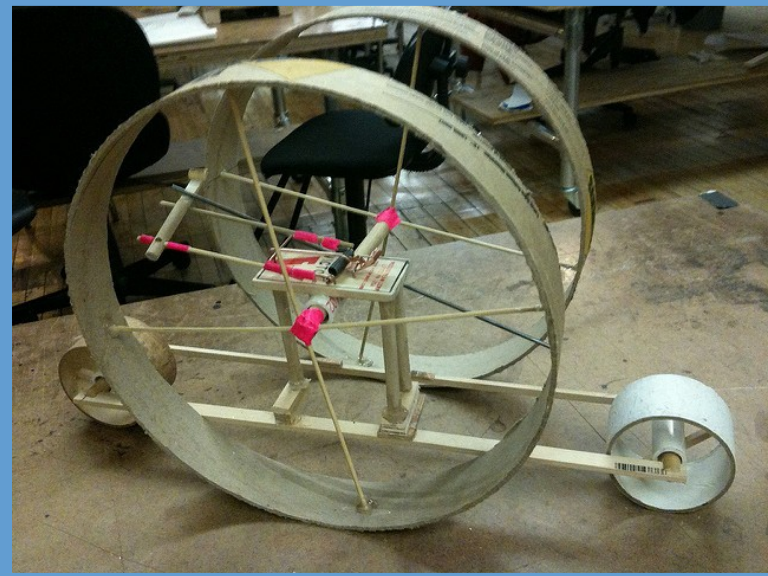


2nd Phase: Septic System Improvement Initiative

- Partially-Funded through the NHDES 319 Watershed Assistance Program
- Voluntary – Incentive based
- Grant paid 1/3 of the cost for repair/upgrade up to \$4000
- 14 replacements
- **Reduction of 5.3 kg TP/yr to the lake
(5,300,000,000 ug TP/yr)**



Take Action



So Ken, how's the water?



- TRENDS & WATER QUALITY DATA
- ISSUES
- OPPORTUNITIES

So, how is your water?



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NHDES, Watershed Management Bureau